IN TWO SECTIONS — SECTION ONE

THE PAPER INDUSTRY and PAPER WORLD

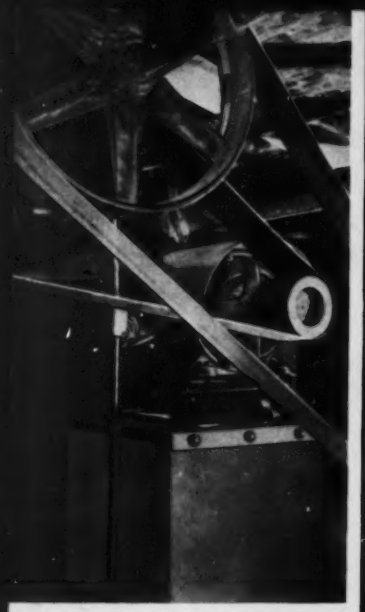
AN EDUCATIONAL NEWS MAGAZINE — MAY, 1942

NEWSPRINT AT 5000 F.P.M.
or even 10,000 feet per minute

HOW will newsprint be made in the Year 1 or 5 or 10 A.V. (After Victory)... will the fourdrinier machine be used for the super-speeds that are bound to come... or will an entirely different type of machine make newsprint better and faster than seems possible, in these days when nothing is impossible.* Frankly, we don't know the answer, but we're thinking . . . and planning . . . and we would be most interested in any ideas you may have, no matter how fantastic they may seem. Write our "Vice President in Charge of Making the Impossible Possible" . . . and remember, if you are worried about how to prolong the life of your present equipment or how to make it produce more, our engineers are at your service. . . . The Downingtown Mfg. Company, Downingtown, Pennsylvania.

* Remember, the events at Pearl Harbor on Dec. 7, 1941 were considered impossible prior to that date.

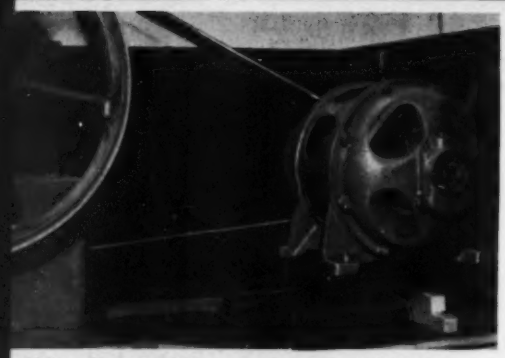
ROCKWOOD
automatic belt tightening
MOTOR BASES



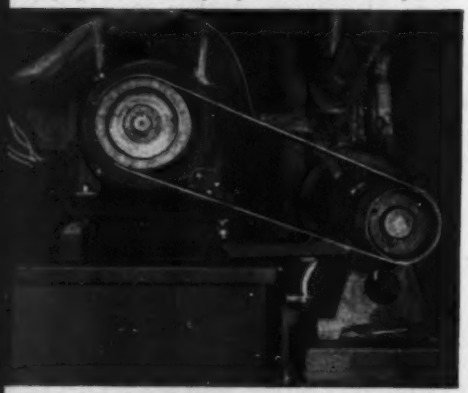
Above
50 h. p. Rockwood Drive to wet end of paper machine. The Rockwood automatic belt tightening base eliminates belt slip—regardless of load.

Right
75 h. p. Rockwood Drive to couch roll vacuum pump—speed is maintained and pump has more capacity.

Above
15 h. p. R... Drive to wet ... auxiliary pa... chine.
With Rockw... oted motor b... belt tighten... matically ma... load — increa... the load in... and slacking ... the load de...



75 h. p. Rockwood Drive to air compressor, S. D. Warren Company. Increases capacity. Saves belts and power.



5 h. p. Rockwood Drive to stock pump. ***These pictures show nly a few of the close to 200 Rockwood Bases used this mill. Rockwood automatic belt tightening Bases re used with agitators, beaters, Jordans, screens, etc.***

NEARLY 200 IN THIS GREAT MILL

S. D. Warren's mill.

By changing from old fashioned "fixed-center" motor slide rails to *automatic belt tightening* Rockwood pivoted motor bases, paper mill machines always perform better. Their use increases the work done per machine hour. Machine operation becomes more dependable. Drive maintenance is reduced. Belt life is increased. *More continuous machine operation without trouble or shut downs is assured.*

MODERNIZE *YOUR* MOTOR BELT-DRIVEN MACHINES NOW. Bring them up to date! Install Rockwood Pivoted Motor Bases. They keep the belts always at correct tightness—automatically. For V-belts *or* flat belts. The cost of the change is small. The work can be done quickly—in a few hours or a day, at most.

WRITE FACTORY for further information—or get in touch with your local Rockwood distributor for further details.

ROCKWOOD MANUFACTURING COMPANY
Indianapolis, Indiana

Introducing -

"THE BIG SWEDE"

Engineering MAKES THE MACHINE **BELOIT**

★ ★

"THE BIG

182" Glassine and Grease-proo
production by Rhinelander Pap

G SWEDE"

e-proof Machine recently put into
r Paper Co., Rhinelander, Wis.

★ ★

Through the courtesy of Rhinela
Paper Company, reproduction
this machine as portrayed here,
be obtained by writing to the
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★

hinelander
uctions of
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the Beloit
sconsin.

Twenty-Third Annual

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Grand Rapids, Michigan

JUNE 16-17-18, 1942

Open Forum on

MAINTENANCE AND CONSERVATION

IN

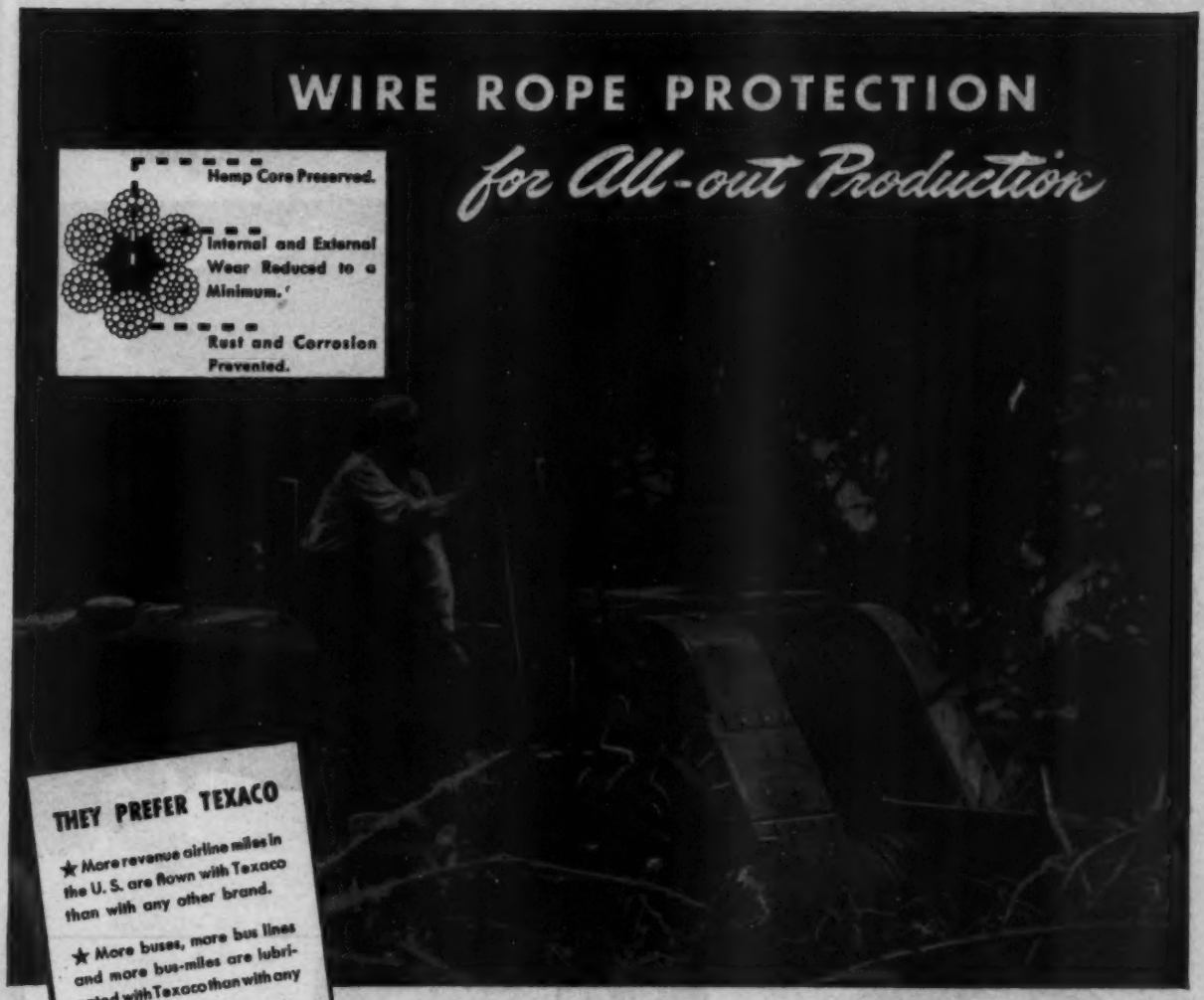
Pulp and Paper Mills

Write Hotel for Reservations

THE AMERICAN PULP AND PAPER MILL
SUPERINTENDENTS ASSOCIATION, INC.

WIRE ROPE PROTECTION

for All-out Production



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★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

★ More locomotives and cars in the U. S. are lubricated with Texaco than with any other brand.

FOR YOUR ENJOYMENT
FRED ALLEN every Sunday night. See your local newspaper for time and station.

DON'T GAMBLE with all-out production. Give your wire ropes maximum protection. Wear, rust and corrosion must be held to a minimum . . . and will be when you use *Texaco Crater.*

Texaco Crater penetrates to the very core of wire rope, coating each wire in a tough, viscous film that cuts down wear, seals out moisture, prolongs rope life.

The outstanding performance that has made Texaco preferred in the fields listed in the panel has made it preferred in the logging operations of prominent pulp and paper mills everywhere.

These Texaco users enjoy many benefits that can also be yours. A Texaco Lubrication Engineer will gladly cooperate . . . just phone the nearest of more than 2300 Texaco distribution points in the 48 States, or write: The Texas Company, 135 East 42nd St., New York, N. Y.

Care for your Car ... for your Country

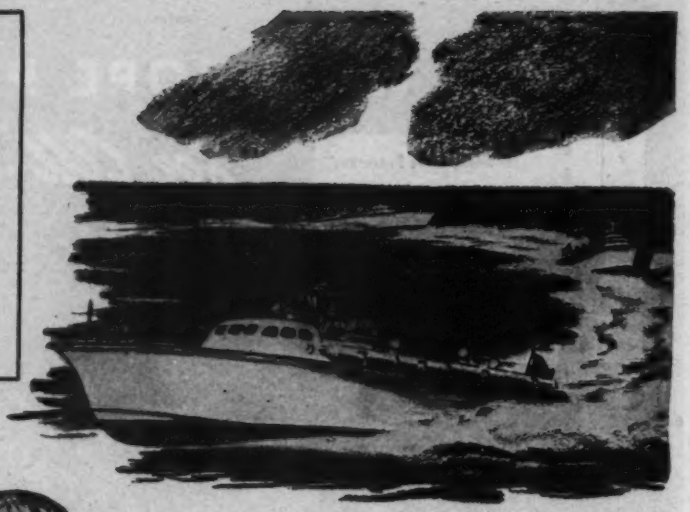
TEXACO

TEXACO Lubricants and Fuels

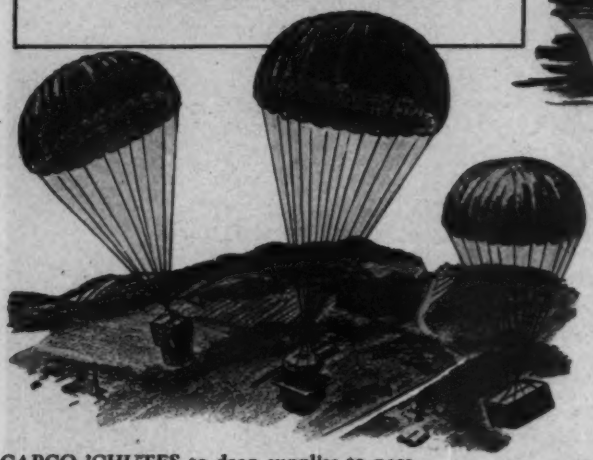
FOR THE PAPER INDUSTRY

HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

Caustic Soda *helps speed America's War Effort!*



"PT" BOATS clip the waves at 70 miles per hour! Speed is their chief defense. If their powerful engines fail in battle—they are dead ducks! To assure trouble-free timing, ignition systems are insulated with phenolic resins—the best non-conductor yet devised. In the synthesis of phenol by the sulfonation process, caustic soda is an essential raw material.



CARGO 'CHUTES to drop supplies to paratroops or isolated garrisons are now being made of rayon. Although still in the experimental stage, rayon promises to replace other fabrics which are needed for parachutes that carry human cargoes. Largest U.S. user of caustic soda, the rayon industry produces rayon cord for tires...high-tenacity fabric for self-sealing gasoline tanks.

BIG GUNS that can tear a tank to shreds ride on tires that are part new, part reclaimed rubber. In reclaiming rubber from used tires, caustic soda is used to dissolve the cord fabric, thus separating it from the rubber which is to be reworked.

UNCLE SAM'S "Battlewagons" pack a lethal wallop with their bristling batteries of 16-inch rifles. Breeches are loaded with smokeless powder neatly stitched in silk bags. In the manufacture of smokeless powder, caustic soda is used to purify the cotton linters.

TORPEDO PLANES are poison to enemy warships. Whether based on land or sea-roving carriers, U.S. warplanes burn staggering quantities of lubricants and high octane gasoline. In replenishing vital supplies of fuel, oil refineries employ caustic soda to remove objectionable sulphur compounds from petroleum products.

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60 E. 42ND STREET, NEW YORK, N. Y.

LIQUID CHLORINE . . . SODA ASH . . . CAUSTIC SODA . . . BICARBONATE OF SODA . . . BLEACHING POWDER . . . HTH PRODUCTS . . . AMMONIA, ANHYDROUS and AQUA . . . FUSED ALKALI PRODUCTS . . . SYNTHETIC SALT CAKE . . . DRY ICE . . . CARBONIC GAS . . . SODIUM CHLORITE PRODUCTS

THE PAPER INDUSTRY
and PAPER WORLD

MAY, 1942 — VOLUME 24 — NUMBER 2

Published monthly by
FRITZ PUBLICATIONS, INC.
59 E. Van Buren St., Chicago, Ill.

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Member:
Audit Bureau of Circulations
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Entered as second class matter June 29, 1938, at the post office at Chicago, Ill., under the Act of March 3, 1879. Subscriptions in the United States, U. S. Possessions, Canada, Cuba and Mexico, $2.00 for one year or $3.00 for two years. All other countries $3.00 for one year, or $5.00 for two years.

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THE PAPER INDUSTRY and PAPER WORLD is indexed regularly in *The Industrial Arts Index*. An index to each volume is issued annually by the publisher as Section Two of the April number.

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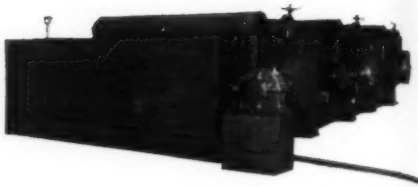
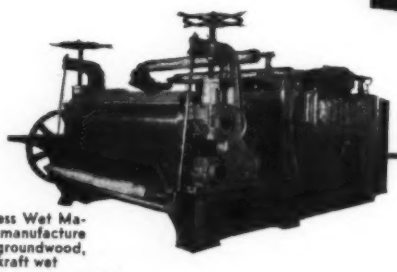
IMPCO PAPER and

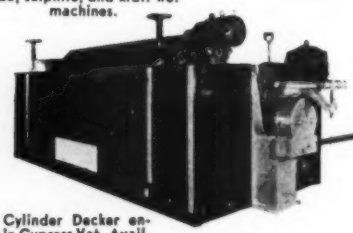
gives you dependable



Impco Wood Vat 3 Stage Two-Agitator Multiple Stage Washer with enclosed battery drive and driven couch rolls.

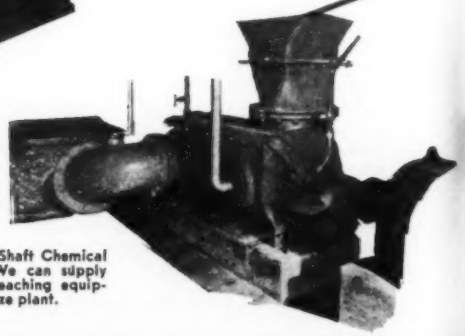


Impco 2-Roll Single Press Wet Machine, using felts. We manufacture a complete line of groundwood, soda, sulphite, and kraft wet machines.



Open Cylinder Decker enclosed in Cypress Vat. Available in a wide range of constructions, offering maximum water removal capacity.

Impco Pneumatic Fresh Water Filter provides excellent clarity and cuts cleaning costs.



Low Density Single Shaft Chemical and Pulp Mixer. We can supply mechanical pulp bleaching equipment for any size plant.

THE impco Line comprises many types of specialized Machines for utmost efficiency in the various stages of Pulp and Paper Manufacture. All machines are designed to fill the most exacting specifications and are the result of our many years' experience in solving mill production problems.

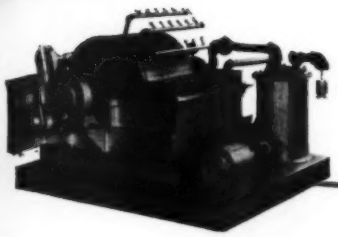
If you contemplate additions or alterations to your mill, impco engineers will gladly review your flow sheet plans with you. We are also in a position to manufacture special equipment for you to suit your particular mill requirements to best advantage.

Full particulars regarding impco Service and the Complete Impco Line will be sent upon request.

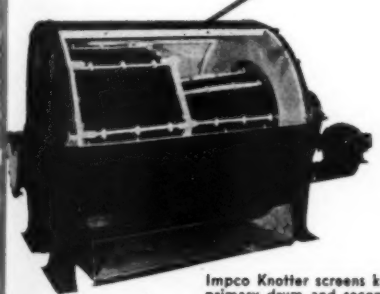
IMPROVED PAPER

PULP MAKING EQUIPMENT

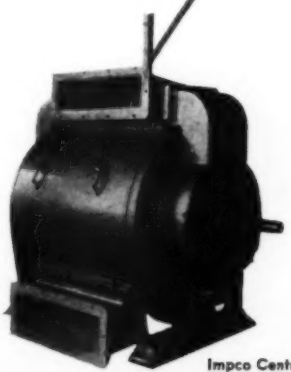
Production Control



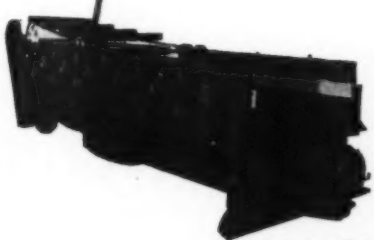
Impco 30 inch Multi-Purpose Washer with adjustable filter valve, vacuum pump and receiver mounted on a single base—one of several types of washers we manufacture.



Impco Knotter screens knots out in primary drum and secondary drum rewashes stock to make it fibre free.



Impco Centrifugal Screen for Kraft. Screen capacity range from 40 to 100 tons per unit.



Impco Flat Scre... Drive. Availabl... creening fine... and soda...

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universally recognized as a
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DUST, FLY ASH, FUME, MIST & FOG

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This helpful book covers:
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A FREE BOOK *your belt men need!*

It is our belief that the greatest service we can render in this production drive is to broadcast factual data that will make belts last longer and produce more. Accordingly, we have prepared a pocket-size manual on belt care, covering briefly and clearly the essentials of proper design and maintenance of leather belt drives.

This booklet is offered freely to concerns which wish to have copies for their maintenance men as a guide to proper care of leather belts. Longer life without costly down-time means increased production, which you can count on when high grade leather belts possessing high coefficient of friction are wisely installed. Sign and send the coupon below to–

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Please send me a copy of your booklet "How to Make Your Leather Belts Last Longer . . . . Produce More!"

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City.....

"Let's Get It Done!"

● A fight to finish, a war to win, and in every defense industry vital jobs to be done. The United States Chamber of Commerce adopted as the theme of its thirtieth annual meeting in Chicago the motto—"Let's Get It Done!" This battle cry is spreading from coast to coast. Some carry the thought further . . . "and get it done quickly."

● The President of these United States has spoken to the business executives of the nation as follows:

"Not by machines alone will we win this war. Unitedly, unstintingly, and without interruption or delay, we have solemnly promised to give our men a mounting tide of guns, tanks, planes, and ships. We shall keep that promise, and one promise more . . . that we shall preserve for them, wherever they may be, and without regard to race, creed or color, the moral and spiritual values of the democratic ideals and freedom for which they are now fighting."

● And so the industrial front says "Let's Get It Done!"

(Illustration courtesy National Bearing Metals Corporation.)

TRADE WINDS

General Policies of

PULP AND PAPER BRANCH OF THE WPB

▶▶▶ THE PULP AND PAPER BRANCH of the War Production Board has sent the following statement of its policies to all members of the pulp and paper industry:

Purposes and Objectives

The present objectives of the Branch are:

a) To arrange for the production of the pulp, paper and paper products which are necessary for direct war use and for essential civilian requirements, and to have such production available in adequate quantities where and when it may be needed.

b) To assist the industry in converting capacity now engaged in producing nonessential products to the manufacture of products required for war and essential civilian uses.

c) To assist the industry in arranging for the utilization of its tools and equipment in the production of products other than paper which are needed for war uses.

d) To restrict the industry's use of critical materials: (1) By encouraging the substitution of less essential materials. (2) By curtailing repair and maintenance materials requiring critical metals, rubber and other substances to the basic necessities of manufacture for war and essential civilian uses.

For the attainment of these objectives the following policies shall govern the operation and activities of this Branch:

1—Determination of Product Essentiality

As rapidly as possible, and in co-operation with other interested Government agencies and with the industry, the Branch will determine the relative essentiality of pulp for paper products. It will keep such determination in step with the changing requirements of the war needs.

2—Mandatory Regulations

The Branch will institute and administer such mandatory regulation of the industry's operations as may be necessary for the accomplishment of the objectives listed above. It will not depend upon voluntary industry section.

3—Co-operation in Compliance

The Branch will co-operate with the Compliance Branch and other agencies of the War Production Board in obtaining compliance with all orders.

4—Confidential Data

The Branch will hold in confidence all statistical data and related information reported to it, except as use of such material by other Government agencies or properly constituted committees from the industry may be authorized by the Branch Chief as necessary in the public interest. Similar confidential integrity will be expected from all industry committee members.

5—Use of Questionnaires

It will be the policy of the Branch to restrict the use of questionnaires to the industry to necessities, and to avoid over-lapping or duplication of requests for statistical data and related information.

6—Co-operation with Industry

It shall be the policy of the Branch to seek recommendations from the industry through properly organized committees and groups in respect to the formulation of regulatory measures affecting the industry. It will endeavor to keep the industry informed regarding the character and extent of such regulation of its activities as may be necessary. To that end the Branch will, from time to time, issue general releases covering its activities. It will also make available to the industry such basic data as may be released without detriment to the public interest.

7—Consistent and Uniform Interpretations

In order to maintain the highest possible uniformity and consistency in advice and instructions emanating from any Section or Division of the Branch and to make sure that all activities of the Branch are handled in conformity with existing regulations, the Branch will encourage members of the industry seeking information and rulings with respect to War Production Board orders and regulations or with respect to Branch policy, to submit their requests *in writing*.

8—Co-operation with Canadian Industry

In the formulation and administration of necessary regulation of the domestic industry, every effort will be made through proper channels to obtain the co-operation of the Canadian pulp and paper industry where such domestic regulation may directly or indirectly affect Canadian interests.

9—Advance Planning

In general, it is believed that successful prosecution of the war will necessitate selective production as far as the products of the industry are concerned. It will therefore be the policy of the Branch to endeavor to anticipate requirements and develop plans accordingly as far in advance as may be possible.

◆

NEWSPRINT PRICE TO REMAIN AT $50

"Standard" newsprint paper prices will remain at $50 per ton as the result of Maximum Price Regulation No. 130, which was announced April 29 by Price Administrator Leon Henderson with the General Maximum Price Regulation freezing prices of nearly all cost-of-living items at all levels of distribution.

The new newsprint regulation, effective May 11, 1942, replaces Temporary Maximum Price Regulation No. 16, which on April 1 established maximum prices for standard newsprint at the same levels.

Mr. Henderson explained that the new regulation does not preclude fur-

ther discussions between OPA and the Canadian Wartime Prices and Trade Board concerning Canadian newsprint mills. These mills last December sought an increase of $3 per ton in the price of newsprint for export to the United States to become effective April 1, 1942. The issuance of the permanent regulation does not change the plan of OPA to weigh results of the operations of the industry during the first half of 1942 to determine whether or not a higher price in the second half of the year is justified.

◆

SUTHERLAND MARKS SILVER ANNIVERSARY

No special commemoration was held on April 17, but that date marked the silver anniversary of the Sutherland Paper Company, Kalamazoo, Michigan, in the board and container manufacturing field.

In 1917, Louis W. Sutherland, together with the late Fred W. Sutherland and the late Oscar Gumbinsky, founded the company in a machine shop on the site of the company's present No. 1 plant in Kalamazoo. Louis W. Sutherland, the sole surviving founder, is now president of the company.

The Sutherland Paper Company has shown considerable expansion during the 25 years of its existence. Capitalization has risen from $10,000 to $2,870,000, and in 1921, the company's own paperboard mill was erected. Seven years later, in 1928, it acquired the Standard Paper Company, makers of board and folding cartons.

◆

WISCONSIN SALVAGE COMMITTEE URGES CONTINUED DRIVE

In response to a report that the current campaign for wastepaper has glutted local markets, Wisconsin salvage and company officials stated that the condition, if true, is only temporary and urged that paper salvage be continued to prepare for future needs.

W. E. Simons, executive secretary of the Wisconsin salvage committee, stated that while a temporary surplus of wastepaper may occur in certain areas, there should be no relaxation in the campaign. He added that the WPB bureau of industrial conservation had made arrangements to take care of isolated instances of paper surplus and invited dealers who have difficulties in selling wastepaper to get in touch with him.

Clariflocculator tank at Baie Comeau with prestressed steel reinforcing in place.

INSTALL NEW TANKS AT BAIE COMEAU

Many adaptations and substitutions have been forced upon industry because of wartime regulations and priorities. New problems have suddenly arisen demanding new and quick methods of solving them.

The Ontario Paper Company Ltd. investigated the use of calcium carbonate mined in Canada, as a filler for newsprint. It was found that this could be successfully used when certain water conditions could be maintained.

At the Baie Comeau mill of the company's subsidiary, The Quebec North Shore Paper Company Limited, it was decided to install Clariflocculator equipment to make this possible. A contract was arranged with the Dorr Company of Canada Limited to provide Clariflocculator equipment, which has been installed in a Preload reinforced concrete tank built by The Gunite and Waterproofing Company Limited, sole Canadian representatives for the design and construction of Preload structures. The clarified water from this tank is passed to a service building, and from the service building it is passed to a Preload reinforced concrete storage tank from which it can be drawn to the mill and also, through a separate supply system, to the townsite.

The plant was designed by the Engineering Department of the Ontario Paper Company. The design of equipment was prepared in conjunction with the Dorr Company, and the design of the tanks in conjunction with Gunite and Waterproofing Company Limited.

◆

CONSTRUCTION OF CONSOLIDATED DAM IS PROGRESSING

Pouring of concrete has been completed in the construction of the huge Knowlton-DuBay dam on the Wisconsin River two miles south of the Portage-Marathon county line. (Cf. THE PAPER INDUSTRY AND PAPER WORLD, Sept., 1941, p. 526; Nov., 1941, p. 764.) The dam is being built by the Consolidated Water Power and Paper Company of Wisconsin Rapids, and when completed will supply the power needs of that firm.

Construction was begun last September, and the first concrete was poured in December. The concrete used exceeded 29,000 cubic yards and weighed in excess of 60,000 tons. Engineers on the job estimated that if the materials used in the construction had been sent in a single shipment, a freight train 12 miles long would have been required to carry the shipment, which would have included concrete, gravel, steel, timber, and other items.

Installation of machinery at the dam is expected to begin some time in May, depending on the delivery of the various units, and the water wheels are to be installed in June.

PAPER · · · America's 6th Industry

SCOUTS . . . ON THE JOB

(NEWS ITEM: *A nation-wide drive to collect waste paper to aid the war effort is one of the projects of the Boy Scouts of America.*)

Never before has America been so conscious of the importance of paperboard and paperboard boxes. Hundreds of service organizations have established regular collection routes to build up the raw material supply for paperboard.

America has learned that paper is no less a weapon of war than tanks or shells or anti-aircraft guns.

One ton of paper will wrap or package 16,700 rounds of fuses . . . or 670 three-inch anti-aircraft shells . . . or 1,340 75-mm. howitzer shells . . . or 8,000 37-mm. aircraft cannon shells . . . or 1,600 155-mm. howitzer powder charges . . . or 667,000 30-caliber small arms ammunition.

The Puseyjones Machines now being built are going first to those mills where production can be stepped up . . . or where a let-down in quality or quantity of production would imperil the war effort.

In a large Southern mill, the Puseyjones Stream Flow Vat System made practical the increased use of waste paper stock as a substitute for new pulp. A Stream-Flow Wet End gives maximum freedom in stock preparation, saving pulp for vitally needed munitions manufacture. Excellent forming qualities are assured at top drying and driving speeds.

Keeping paper production at the point of highest efficiency is not only essential to Victory, but also best for the tremendous competition coming after the present emergency is over.

THE PUSEY AND JONES CORPORATION

Established 1848. Builders of Paper-Making Machinery

Wilmington, Delaware, U.S.A.

THE SIGN OF SUPERIOR QUALITY

Washington News

ADVISORY COMM. CONFERS WITH WPB

The outstanding development of the month at Washington of direct interest to the pulp and paper industry has been the manner in which the Pulp and Paper Branch of the War Production Board has called into consultation the members of the Advisory Committee who represent all branches of the industry, including paper and pulp manufacturers, converters of paper and both those mills which buy and produce their own pulp.

The Advisory Committee was in conference with Board officials for two days, April 9 and 10, and again on April 16 and 17. At all of these sessions the representatives of the paper industry were given the picture of the nation's war effort from the standpoint of the Government agency, and were encouraged to give their views and recommendations as to the manner in which the industry can best co-operate in that effort.

One outstanding manufacturer is quoted as saying that if the entire industry could have participated in these conferences and learned the problems which face the War Production Board, there would be no hesitation in giving 100 per cent co-operation.

The War Production Board's Pulp and Paper Branch has announced that it will make every effort to keep the industry advised promptly of all developments.

▶▶▶ TO AVOID DISRUPTION of commercial paper markets, the WPB has appealed to public schools and other public institutions to stagger shipments to them of certain paper products so that deliveries can be spread over the year.

▶▶▶ ORIGINALLY NAMED as a member of the Industry Advisory Committee, David Luke, Jr., was relieved from membership to become a consultant without pay to the Pulp and Paper Branch of the War Production Board.

▶▶▶ JOHN BIGGS, who was released by the International Paper Company to serve in the Office of Price Administration, has been commissioned captain in the Quartermaster Corps to assist in the Army's purchases of its paper requirements.

▶▶▶ A DRASTIC REVISION OF the present system of export licenses for paper exports is anticipated, and the probable result will be a limitation of shipments. This is due in part to increasing domestic demands, and to a shortage of ocean shipping.

▶▶▶ GLENN MATHER, whose long experience in the paper industry made him a valuable member of the staff of the Office of Price Administration at Washington has been transferred to New York as chief of the Paper and Paper Products Section of the New York Regional office of OPA.

▶▶▶ AN INDUSTRY ADVISORY COMMITTEE on pulp allocation spends several days each month co-operating with the Pulp and Paper Branch of the War Production Board by making recommendations for the allocation of pulp to consumers during the following month.

▶▶▶ THE FIXING OF A CEILING on pulp prices had been anticipated, but was issued under terms that made its prices immediately effective. Many grades of pulp were materially increased, while others remain at approximately the current selling prices. (See Association Reports.)

▶▶▶ ANY ORDERS FOR pulp and paper machinery must have War Production Board approval if they involve purchases in excess of $1,000, and in case of paper converting orders the maximum is $200. This limitation is imposed in order to permit machinery manufacturers to devote all their efforts to production of machinery for ordnance and other direct war or essential civilian uses.

▶▶▶ THE DETERMINATION OF the War Production Board to enforce compliance with its orders was shown by the seizure of over 5,000 tons of wood pulp which had been held by its owners in excess of inventory regulations.

UNIV. OF MAINE ANNOUNCES ITS SUMMER COURSE

A six-weeks' summer course in Pulp & Paper Technology and Chemical Engineering will be conducted at the University of Maine at Orono, between July 6 and August 14.

The pulp and paper technology courses include lecture courses in pulp and paper manufacture and laboratory courses in papermaking, pulp coloring, and paper testing. These courses are designed for paper salesmen, laboratory helpers, etc., who previously have not had an opportunity to obtain a general scientific understanding of the pulp and paper industry. In addition to class and laboratory work, there will be a number of mill visits.

The chemical engineering courses include laboratory and lectures, the theory of which is based on chemical engineering equipment, some pieces of which are of particular interest to the pulp and paper industry.

A copy of the Summer Session Catalog, which explains courses offered, expenses, etc., may be obtained by addressing Director R. M. Peterson at the University.

◆

CAN. NEWSPRINT SHIPMENTS TO AUSSIE HELD UP

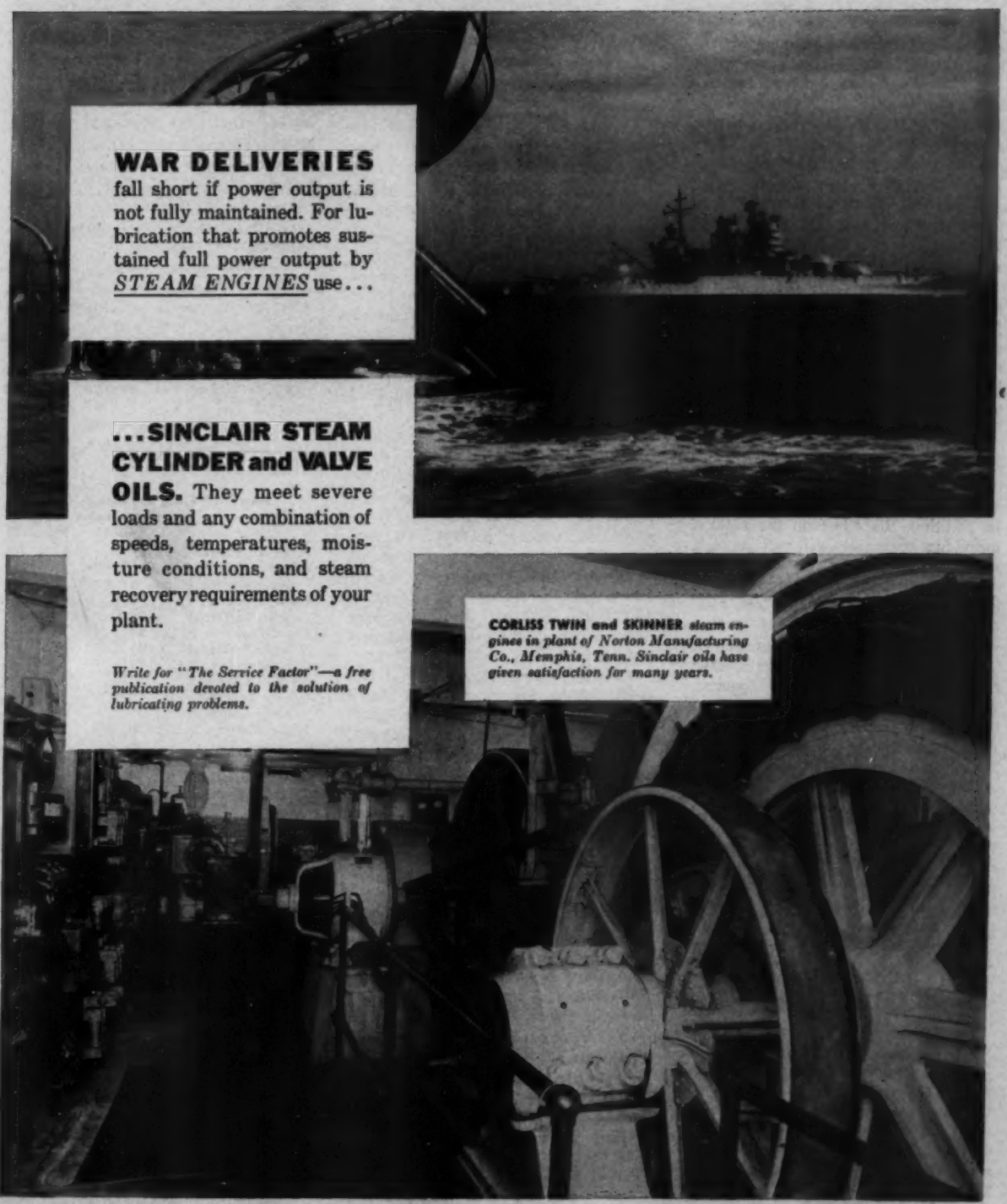
Customs Minister R. V. Kease has announced that shipments of newsprint paper from Canada to Australia have been suspended. He stated that all shipping space must be reserved for more urgent war needs. Australia's present stock of newsprint, plus its own production, still in the early stages, will last two years.

By the loss of this market, Canadian newsprint companies will be affected to the extent of between 60,000 and 70,000 tons in 1942. In 1940, the Dominion shipped 164,021 tons. The year 1941 showed a relatively sharp decline. Indicated demand for 1942 was placed at a top figure of 70,000 tons.

◆

CAN. NEWSPRINT EXPORTS INCREASE

Directly attributing to what has been called "the power shortage threat" in Canada is an increase in the export of newsprint from Canadian mills to United States publishers in March of 25.1 per cent in tonnage as compared with shipments in March last year, representing 83.2 per cent of capacity, as compared with 77.4 per cent in February and 72.8 per cent



WAR DELIVERIES fall short if power output is not fully maintained. For lubrication that promotes sustained full power output by *STEAM ENGINES* use...

...SINCLAIR STEAM CYLINDER and VALVE OILS. They meet severe loads and any combination of speeds, temperatures, moisture conditions, and steam recovery requirements of your plant.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.

CORLISS TWIN and SKINNER *steam engines in plant of Norton Manufacturing Co., Memphis, Tenn. Sinclair oils have given satisfaction for many years.*

SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE NEAREST SINCLAIR OFFICE

SINCLAIR REFINING COMPANY (Inc.)

2540 West Cermak Road, Chicago • 10 West 51st Street, New York City • Rialto Bldg., Kansas City • 573 West Peachtree Street, Atlanta • Fair Building, Ft. Worth

in March of last year. The total shipped to the United States in March was 266,034 tons, as compared with 212,727 tons in March, 1941. The inference drawn is that publishers are stocking up in anticipation of a shortage later on, and this is supported by returns compiled by the Newsprint Association of Canada showing that apparent stocks of all United States publishers increased 31,556 tons in March and amounted to 629,778 tons at the end of the month.

As a matter of fact, there are no signs of an immediate curtailing of power for newsprint mills, and the exact extent of power rationing that may have to be undertaken later in the year is still uncertain. In working out tentative schedules for deliveries, many factors have to be taken into consideration. For instance, some communities are largely dependent on newsprint mill operations, and this will have to be taken into account. In addition, the effect on the various individual companies will vary, as such rationing as may be put into effect can be applied only to mills in Quebec and southern Ontario that are connected with the power grid system, which also feeds the aluminum plants.

Much will depend on water storage conditions, particularly in Quebec, where considerable part of power produced is dependent on stored water. At present storage conditions are favorable. Good rainfall this summer and generous storage late this year would lessen considerably the amount of power that would have to be diverted from newsprint mills. In any case, it is thought that restrictions in power deliveries to newsprint mills might be in effect for only a temporary period next winter.

◆

FINANCIAL

Because of uncertainty as to the war situation, Stock Market prices declined in the week ending April 25 to the lowest averages since 1933. The recession was not so much due to fear as to the eventual outcome of the war or the uncertainty of its probable duration and the effect which the nation's war program will have on industrial production. Paper mill securities followed the general trend.

American Box Board Company—Income for the fiscal year ending November 28, 1941, was $436,410 as against $243,829 for the previous fiscal year.

American Writing Paper Corporation—Net earnings for 1941 were $353,494 as against $26,214 for the previous year.

Bryant Paper Company—Net profit for 1941 was $314,065.

Certain-teed Products Corporation—Net profit in 1941 was $1,362,063 as against $610,383 in 1940.

Continental Diamond Fibre Company—Net profit for 1941 was $895,860 as against $559,652 in 1940.

Dennison Manufacturing Company—Net profit for 1941 was $816,917 as against $759,791 in 1940.

Robert Gair Company, Inc.—Net profit for the three months ended March 31, 1942, was $360,250, after depreciation, interest, and dividends of subsidiary company, but before computing interest on income notes.

Gaylord Corporation—Net profit for 1941 was $1,349,124 as compared with $1,391,039 in 1940.

Hinde & Dauch Paper Company—Net profit for 1941 was $1,112,195 as against $975,458 for the previous year.

International Paper Company—Net profit for 1941 was $16,253,761 as against $15,696,577 in 1940. The provision for income and excess profits taxes for 1941 was approximately $27,500,000 as against a tax charge of $7,500,000 for 1940. Total sales were one-third above the previous high record established in 1940.

Kimberly-Clark Corporation—Net profit for the quarter ended on March 31, was $535,497 as compared with $479,658 for the same quarter in 1941.

Mead Corporation—Net profit for 1941 was $2,109,785 as against $1,426,881 in 1940, despite an increase of $700,000 in taxes.

Minnesota & Ontario Paper Company—Net earnings for 1941 were $1,827,516, in 1940, $781,232.

Munising Paper Company—Net profit for 1941 was $268,467 as against $208,438 in 1940.

Nashua Gummed & Coated Paper Company—Net profit for 1941 was $563,448 as against $368,030 in 1940.

Nekoosa-Edwards Paper Company—Net income for 1941 was $751,784 as against $558,986 for 1940.

Northern Paper Mills—Net profit for 1941 was $605,193 as against $522,633 for 1940.

Port Huron Sulphite and Paper Company—Net profit for the fiscal year ending January 31, 1942, was $206,850 as compared with $171,228 for the preceding fiscal year.

Puget Sound Pulp & Timber Company—Net profit was $1,076,178 as against $795,553 for the previous year.

Rayonier, Inc.—Net profit for nine months ending January 31, 1942, was $2,697,826 as compared with $3,031,953 in a similar period a year ago.

River Raisin Paper Company—Net profit for 1941 was $85,312 as against $69,021 in 1940.

Scott Paper Company—Net earnings for 1941 were $1,939,629 as compared with $1,896,052 for the preceding year.

Simplex Paper Corporation—Net income for 1941 was $172,662 as against $146,578 in 1940.

Sound View Pulp Company—Net income for 1941 was $1,794,006 as against $1,821,994 for the preceding year, though net sales increased in value over $2,000,000.

Southern Advance Bag & Paper Company—Net income for 1941 was $705,488 as compared with $768,390 in 1940.

Union Bag & Paper Corporation—Net profit for 1941 was $2,168,313 as against $2,134,391 in the previous year.

Valve Bag Company—Net income for 1941 was $133,035 as against $122,091 in 1940.

New York Stock Exchange—Stocks

	Closing Prices April 25	March 25
A. P. W. Paper Co.	1	*1⅛–1⅜
Celotex	6¾	7⅛
Same Preferred	70	*68½–74
Certain-teed	1⅞	*1⅞–2
Same Preferred	26⅝	28
Champion P. & F. Co.	15⅛	15½
Same Preferred	93	97
Container Corp.	12¼	13¼
Cont. Diamond	7¾	7½
Crown Zellerbach	10⅛	10¾
Same Preferred	78	79½
Dixie Vortex	8	*8⅛–8¼
Same "A"	33	*33½–34⅜
Robert Gair	1⅜	1⅞
Same Preferred	9½	10
Gaylord Container	8½	*9–9¾
Same Preferred	51	*51–52
International Paper	11½	13
Same Preferred	52	55½
Kimberly-Clark	26⅛	*27½–27⅞
MacAndrews & Forbes	15⅜	*18–19
Masonite	24¼	25½
Mead Corp.	6⅛	6⅞
Same Preferred	66	77
Paraffine Co.	21⅞	*22–23¾
Same Preferred	90	90–95
Rayonier	8⅛	9½
Same Preferred	25	*24¾–25¼
Scott Paper	26½	*30¼–31
Same 4½% Pfd.	113	114
Same 4% Pfd.	103¼	107⅝
Sutherland Paper	18½	18½–19
Union Bag & Paper	7⅞	8¼
U. S. Gypsum	42	45⅛
Same Preferred	164	168¾

New York Stock Exchange—Bonds

Abitibi 5%	50¼	62⅜
Celotex 4½%	96⅜	95½
Certain-teed 5½%	86	86¼
Champion P. & F. Co. 4¼%	105	.....
Inter. Paper 5%	103½	.....
Inter. Paper 6%	104¾	105

New York Curb Exchange—Stocks

Am. Boxboard	.....	.....
Great Northern	30	30
Hummel-Ross	4¼	.....
Nat. Container	8	8¾
St. Regis	1⅝	2
Taggart	2¾	3
United Wall Paper	1⅛	.....

*Closing Bid and Asked Prices.

"WE'VE JUST BEGUN TO FIGHT"

—JOHN PAUL JONES

Founder of the U. S. Navy . . . a seaman of great bravery and technical ability . . . his exploits on the sea were daring, courageous and successful.

Today . . . the battle of production has just begun. "Keep them Rolling" is industry's order of the day. And Jones' craftsmen are doing their share in producing war equipment. Every effort, likewise, is being made to serve our customers with their essential requirements without trespassing on war needs.

Jones

E. D. JONES & SONS COMPANY-PITTSFIELD, MASS.

Builders of Quality Machinery for Paper Mills

FOREST PROTECTION CALLED WARTIME DUTY

▶▶▶ IN PRACTICING STRICT WARTIME conservation, there should be even more attention given to protecting our forests from fires. The New York State College of Forestry sends a special plea in behalf of the forests through its regular news service. It is brought out that the fire prevention forces have been reduced by reason of war enlistments, leaving a dangerous situation which must be recognized and remembered by all sportsmen and tourists.

The threat of sabotage also is pointed out—it is possible that enemies might set fires which would destroy not only a forest, but the conflagration might easily spread to war industries located in forest areas. We should be prepared to meet such a contingency.

State of Alabama Launches "Tree Farms"

The Alabama State Chamber of Commerce launched the new "Tree Farms" Program at Brewton, Alabama, April 14, by impressive ceremonies. On that date, certificates were presented to more than thirty owners of lands in the State which had been designated by the State Forester as "tree farms." The occasion was honored by the presence of Alabama's Governor, Frank M. Dixon, who spoke to the gathering.

Under this program, privately-owned areas, both large and small, will be dedicated to the growing of forest crops for commercial purposes; they will be protected and managed for continuous forest production by applying commonsense forestry practices.

To qualify his land as a "tree farm," the owner must protect his property from forest fires, and he must practice selective logging or other controlled partial cutting with the view of assuring continuous production of commercial timber crops, in accordance with practices approved by the State Conservation Commission.

At the present time more than 4,000 individual landowners in Alabama are contributing funds to participate in the forest fire protection program, and are adhering to the minimum forestry requirements recommended by the State Department of Conservation.

It is understood that this program will be introduced into other Southern states as rapidly as possible; the next probable activity may be in Arkansas.

State of Washington Will Protect Forests

"Protection of the forests from fire is a defense job. We can't have fires." So spoke Charles S. Cowan, chief fire warden of the Washington Forest Fire Association when he spoke before the Chamber of Commerce at Everett, Washington, April 21. Wood is classed as a critical material—lumber is needed in nearly every industry, and pulpwood is vital to the manufacture of paper. The Pacific Coast section is a vulnerable point of attack and a heavy blanket of smoke from forest fires would impede flying, and might destroy valuable property and cause loss of life. Also fire is one of the most dangerous and easily implemented weapons in the hands of the saboteur. Sabotage in the forests of the Pacific Northwest is possible and dangerous. Fire and destruction of timber will hamper the War effort. The warden closed his talk by saying "Not only do we need lumber now, but we shall need it in increased proportion when the War is over and the rehabilitation of the world begins."

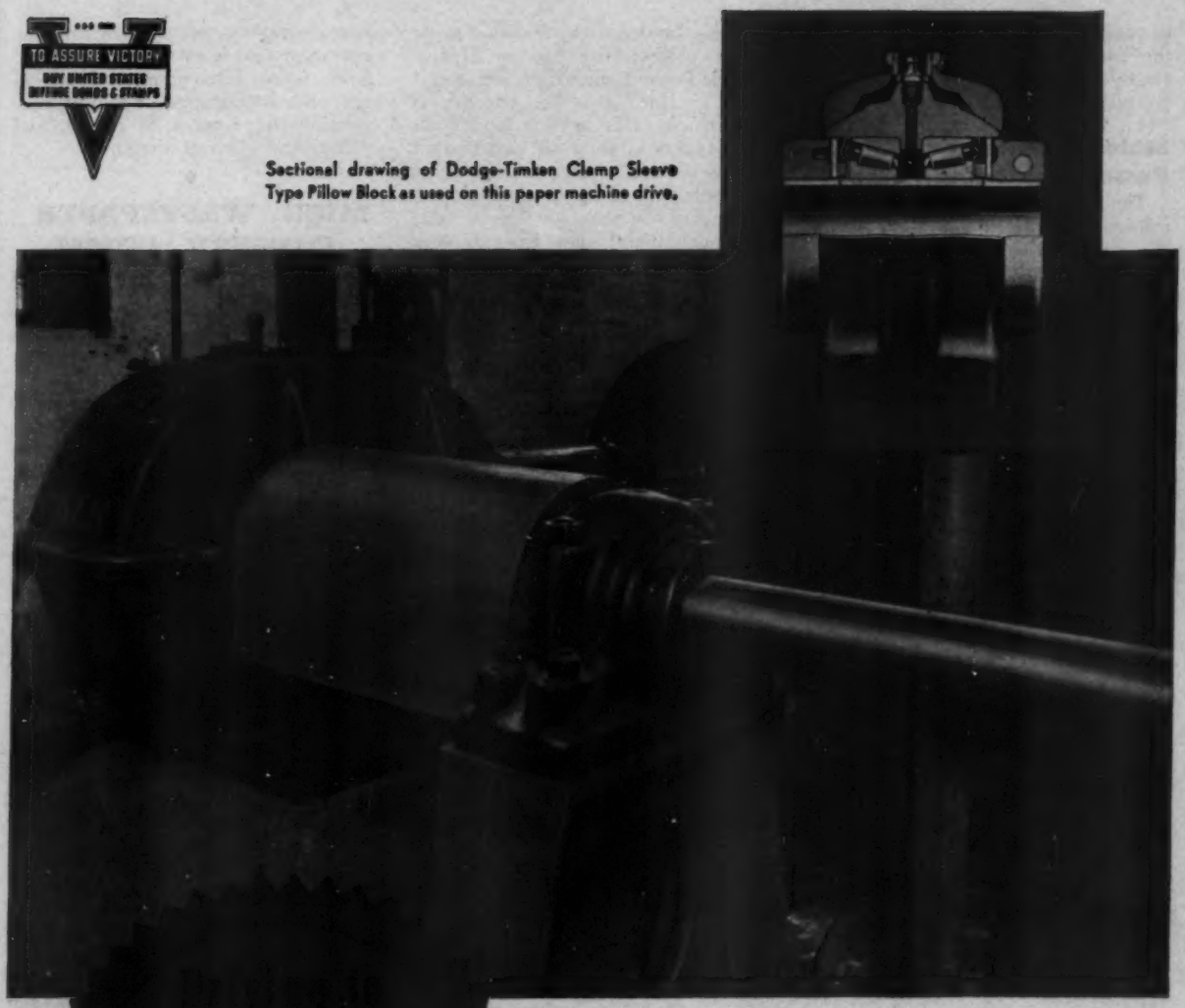
Heaviest Forest Fires Since 1923 in Canada

Forest fires in Canada raged last year over 4,250,000 acres, causing total damage of $13,242,179 (including cost of fighting blazes), the worst forest fire year since 1923. Average loss in the previous ten years was $4,498,463. Actual cost of fighting forest fires last year was $1,307,059, an increase of about $500,000 over the ten-year average. Fortunately, the 1941 fire season was not of equal severity in all parts of Canada, and with the exception of Quebec, Ontario, and Alberta, the fire losses were below the annual average for the previous decade. Twenty-three per cent of all fires occurring in 1941 were caused by lightning, while the balance of 77 per cent was due to human carelessness. An important measure for improving regulations for forest conservation was introduced in the Quebec Legislative Assembly by which all lumber companies, and not railway companies only, would be obliged

LEFT—In dedicating the first group of Alabama Tree Farms, Gov. Frank M. Dixon said: "There is almost no limit to the benefits which perpetual forestry can bring to the State of Alabama." RIGHT—E. N. McCall, the first Tree Farmer to receive his award, is assisted in posting his Tree Farm sign.

TO ASSURE VICTORY
BUY UNITED STATES DEFENSE BONDS & STAMPS

Sectional drawing of Dodge-Timken Clamp Sleeve Type Pillow Block as used on this paper machine drive.



Top speed operation in paper mills involves a great many Timken Bearings. All kinds of equipment have them—from shredders to super calenders.

The sectional paper machine drive pictured here shows the application of Dodge-Timken Pillow Blocks on the drive shaft. Thus supported, the shaft is held rigidly in alignment, yet turns with utmost freedom and smoothness, saving power and making lubrication a simple matter. Moreover, since all rotating movement takes place within the bearing itself, there is no wear whatever on the shaft which, throughout its lifetime of service, remains as true as when first installed.

It pays to have Timken Bearings in your equipment—whatever it may be.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

Manufacturers of Timken Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; Timken Alloy Steels and Carbon and Alloy Seamless Tubing; and Timken Rock Bits.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

to place at the Government's disposal the number of employees needed to assure the observance of forest-fire protection provisions.

State of Wisconsin Passes Law to Curb Fire

The Wisconsin Conservation Commission has ordered a drastic curb on the use of fire in state forest areas. Effective April 25, the order was designed to meet unusually hazardous forest conditions, brought about by a heavy litter of slash left by extensive harvesting and the more than usual number of men in the woods. Fewer trained men are available for fighting forest fires which would result in less certainty in control of fires. Here, as in other states, curtailment of CCC camps is being felt.

▶▶▶ LOSSES FROM FOREST FIRES in New Brunswick during 1941 were the lowest in a long period of years, with the exception of 1936. This was largely the result of intensified efforts put forth under the direction of the Minister of Lands and Mines, plus active co-operation of the New Brunswick section of the Canadian Forestry Association in securing the support of the various municipal councils, co-operation of licensees, efficient work on the part of the New Brunswick Forest Service, and educational efforts in the interest of fire protection.

▶▶▶ AMONG THE ARMY INTELLIGENCE, FBI, and state officials, there is a growing opinion that the score of fires which broke out so suddenly in New England woodlands on May 1 were deliberately set. An occurrence such as finding fifteen fires along a three-mile stretch of road close to the location where the Government has stored lumber supported this consensus. Damage was estimated unofficially at well above $2,000,000. Governor Howard McGrath of Rhode Island stated, after viewing army aerial photographs of the fire, that he was convinced the fire did not originate from a single blaze, and Massachusetts Conservation Commissioner Raymond J. Kenney declared his agents had found evidence that some of the fires were "deliberately set."

◆

ONTARIO STUDIES NEW POWER SITES

Faced with a potential power shortage this autumn of between 150,000 and 300,000 horsepower, the Ontario Government will give early consideration to development of power sites on the upper Ottawa River, it is reported. In that area, studied for its power potentialities by the Hydro-Electric Power Commission for several years, are three sites: Paquette Rapids at Pembroke, Des Joachim Rapids, 35 miles farther up the river, and Doyle's Rapids, another 25 miles north. These are estimated to be capable of providing Ontario with 300,000 to 400,000 horsepower. However, if work started at once, it would require about two years before the first power deliveries reached central Ontario.

The only new Ontario-generated power to be obtained this year will be from the 54,000 horsepower plant at Barrette Chute on the Madawaska River. First deliveries are expected July 1.

◆

CHANGE METHOD OF COMPUTING USE OF CHLORINE

A change in the method of computing the permissible use of chlorine in the treatment of rag stock under General Limitation Order No. L-11 has been ordered by the War Production Board.

Order L-11 limited the use of chlorine in the treatment of rag stock according to the total amount consumed during a base period. Amendment No. 1, effective April 20, changes the basis of limitation to the amount used per ton of rag stock treated.

The effect of this change is to afford relief to some paper mills which were already conserving chlorine during the base period by using a minimum amount per ton, and whose production has been unduly restricted under the method of computation set up in the original order.

◆

PUBLISHERS ASS'N DISCUSSES PRESENT NEWSPRINT PROBLEM

The newsprint situation was discussed in detail at a meeting in New York, April 22, of the American Newspaper Publishers Association. Especial attention was given to the possibility that a demand for power for aluminum production may force a reduction in output of Canadian newsprint mills, which are chief users of such power at present.

The order banning a projected increase in the price of newsprint was discussed, but the Paper Committee of the Association called attention to the fact that this order was temporary only, pending a review of the situation to determine whether an increase is justified. The manner in which newspapers in all parts of the country are endeavoring to conserve newsprint by operating efficiency was described. Some seven different methods are in use, such as limitation of returns, condensing the number of papers, and cutting the width of margins.

◆

MICH. WASTEPAPER CONSERV. COMM. IS DISCONTINUED

A general "clearing-up" of the wastepaper situation has resulted in discontinuance of some activities of the Michigan Wastepaper Conservation Committee, which has its headquarters in Grand Rapids, Michigan.

When the wastepaper shortage became acute some months ago, Michigan paperboard manufacturers agreed to finance the conservation committee in an attempt to uncover additional paper sources throughout the State. Twelve district representatives were appointed to supervise the activity in various sections of Michigan.

Such representation now has been discontinued, although the conservation committee probably will continue to maintain its Grand Rapids office.

During the time of its activity, the committee printed thousands of leaflets urging conservation of wastepaper and other vital materials, and the leaflets have been distributed by county defense councils.

◆

CANADIAN WARTIME BOARD SETS NEW PAPER ECONOMIES

Students' scribblers, stenographers' notebooks, and paper napkins are among items newly brought under the economy program of the Wartime Prices and Trade Board of Canada, and an order by N. E. Wainwright, administrator of converted paper products, specifies the stock, styles, and sizes hereafter to be used exclusively in order to conserve paper and ink and hold costs down.

Concurrently an order by A. P. Jewett, administrator of book and writing papers, set restrictions as to weight, size, color, and finish of certain bond, ledger, book, lithographing, and offset papers.

A third order by F. C. Hayes, administrator of shipping cases, limits the quantity of paper which may be used in the manufacture of solid fiberboard and double-face and double-wall corrugated fiberboard cartons.

Sizes and weights of toilet tissue are specified. Manufacture of four-ounce and five-ounce rolls is to be discontinued, and no new designs of two-color labels are to be produced.

Double Your Belting Life Line With Research Waterproof Leather Belting

Whether fixed centers or pivoted motor base, Research Leather Belting — waterproof, long-lived — offers you lowest belt cost, continuous production.

Overloads? Small pulleys? Research is the answer—with its natural overload capacity, "built-in" pulley grip, extra pliability. You *double* the life of your belting when you replace rubber with Research Leather Belting.

Non-stop production? High speed? High torque? Again, your answer is Research Belting—leather with stretch removed in manufacturing, permanently high transmitting capacity.

Put Research on any tough drive—beater, jordan, paper machine — and find out for yourself why Research is called:

Better than rubber, best in leather

Research Leather Belting on Rockwood Drive to Beater

GRATON & KNIGHT CO. Worcester, Massachusetts
Only leather belting manufacturer with complete nation-wide service facilities. Distributors listed

2-WAY SYSTEM OF COMMUNICATION FOR AIR RAIDS

A large building in Metropolitan New York has developed a new application of a standard two-way communication system for use in the event of an air raid. It is separate from the regular telephone service and eliminates the need for disturbing sirens, bells, or whistles. This system, manufactured by Executone, Inc., New York City, has been recommended by the Office of Civilian Defense.

Under this plan, all tenants and employees are divided into forty air raid sectors. Each sector has a warden, and serving him is one remote station of this communication system. The remote stations connect to a master unit in the chief warden's headquarters, where simultaneous messages to all of the remote stations may be broadcast, or calls made to or received from individual stations. This broadcast is intended to direct the activities of the sector warden on each scene, as well as back up instructions and prevent panic.

◆

FURTHER PLANS FOR DEXTER SULPHITE CO.

Following the sale of the Dexter Sulphite Pulp and Paper Company, Dexter, New York, (cf. THE PAPER INDUSTRY AND PAPER WORLD, p. 21, April, 1942) announcement has been made that the new management proposes to further rehabilitate the Dexter mills and to make many improvements.

One of the first acts of the new management has been the negotiating of contracts for the sale of its products. A sales agreement has been entered into with the Cellulose Sales Corporation of 250 Park Avenue, New York City, for the sale of all the sulphite produced at the Dexter mill, and a similar contract has been made with Johaneson, Wales & Sparre, Inc., of the same address, for the sale of all paper produced. The Dexter Sulphite Pulp and Paper Company will have an office at 250 Park Avenue, New York City.

The manufacture of the present grades of paper will be continued for the present, but with the expectation of gradually getting into a line of better grades.

Temporary officers of the corporation have been elected for the purpose of completing the reorganization of the corporation, and it is expected that E. F. Malkin will become the permanent president and will move his residence from Quebec to Watertown; K. C. Irving will be the vice president, and A. Raymond Cornwall the secretary.

Mr. Malkin comes from Quebec and is part owner of two pulpwood concerns and an officer of the D'Auteuil Lumber Company, also a pulpwood concern in Quebec. Mr. Irving is from St. John, New Brunswick, and is new to the paper industry. Mr. Cornwall, who has assisted in handling the receivership, will remain with the new organization as a director and as attorney, and will assume the office of secretary of the corporation.

N. R. Johaneson, president of Cellulose Sales Corporation and Johaneson, Wales & Sparre, Inc., will be elected a director of the corporation, and other interests will be represented on the board when the reorganization has been completed.

Two-way communication system adapted for air raid use in industrial plants and buildings.

◆

POWELL RIVER CO. PLANS CHIPPING PLANT ON FRASER R.

The establishment of a chipping plant in the Queensborough district is planned by the Powell River Company, Powell River and Vancouver, British Columbia. The council granted a ninety-day option on 10.5 acres near the Westminster Shook Mill and adjoining the Richmond Municipal boundary. The proposed site is on the north arm of the Fraser River. The cost of the proposed plant was not disclosed, but it is expected to employ about forty persons. In recent years mills have been established in this area cutting hemlock lumber, and the Powell Company's move is to use the waste from these mills for papermaking purposes.

◆

LACK OF PULPWOOD FACES BRITISH COL.

Considerable anxiety among pulp and paper operators in British Columbia is being caused by shortage of labor, which already has brought a critical shortage of logs, plus continued export of hemlock pulpwood to the United States, according to the *Financial Post*.

Curtailment in paper production almost to the point of complete shutdown is in prospect unless the situation shows substantial improvement is the opinion of the chief executive of one of the largest mills on the coast.

The Timber Control Board, meantime, has increased the price of hemlock from $13 to $15 a thousand feet with a view to providing incentive for greater production, but in raising the price the Board also felt that the new setup would provide an additional surplus of logs for export to the United States.

A fair share of the British Columbia cut is expected by Washington since much of the United States production has been allocated for lend-lease purposes, and our mills are anxious to increase their purchases in British Columbia.

Crown grant timber constitutes all pulpwood exported, and logs from licensed areas are prohibited from ex-

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CALENDER
ROLLS

NO matter how different your finishing problem may be, in the complete selection of Appleton Super-Calender Rolls you can find the roll you need for your papers. The wide range of fillings, many developed to meet special requirements for the manufacture of certain papers, permits the choice of the right finishing surface to produce the right finish on any super-calender or embossing application

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port unless the shipments are passed upon by an export advisory committee comprising three loggers, three sawmill men, and the chief forester.

The licensed timber areas will feel the effect of the higher prices most of all since they have large stands running heavily to hemlock instead of the more readily marketable Douglas fir, which has been left untouched because of the low prices hitherto obtainable. These areas are the chief source of supply for the British Columbia pulp and paper mills which will now have more pulpwood, but at a higher price.

The labor situation in British Columbia, however, dominates the whole log supply position, and some logging operators express the opinion that the shortage of man power in the woods is worse than it has ever been. Every camp has lost men to the fighting forces and war industries, and many of them have been operating with relatively inexperienced crews with consequent loss of efficiency.

Lower log production earlier in the year was caused by adverse weather conditions and many operators were reluctant to embark on long-term development programs because of the hazards of the business for which there is little or no allowance in Canada's income tax system.

Meanwhile, operators in the coast province are expressing alarm at the heavy exports of hemlock pulpwood logs. They point out that in 1940 the exports of hemlock and other pulp species to the United States from British Columbia amounted to nearly 150,000,000 board feet out of a total cut of about 862,000,000 ft., or 17 per cent, while last year the exports rose to more than 190,000,000 ft. out of a total cut of 803,000,000 ft., or 23.7 per cent. Thus, the amount of hemlock available for British Columbia industry was 100,000,000 ft. less in 1941 than in the year previous. In view of the demand for nitrating pulps used in the making of explosives, an inventory shortage as of December 31, 1941, was created amounting to 72,000,000 board feet.

As a measure of international cooperation, the British Columbia mills will continue to permit log exports to Washington pulp mills, but they will contend that in granting permits for export, allowance should be made for the fact that United States mills are working seven days a week compared with six days in British Columbia. They will contend, too, that exports should be permitted only from the West coast of Vancouver Island, which is relatively inaccessible to the major pulp and paper mills of British Columbia in an economic sense.

CERTAIN-TEED GENERAL OFFICES NOW IN CHICAGO

On April 20, the general offices of the Certain-teed Products Corporation were formally opened at 120 South La Salle Street, Chicago. The research laboratory of the company is being established at 1234 West Jackson Boulevard.

The executive offices were transferred from New York City, and the engineering and manufacturing departments from Buffalo, New York. However, the New York District Sales Office, Export Department, and Gypsteel Department will remain at 100 East 42nd Street, New York City.

◆

CAN. PULPWOOD CONTRACTS MUST HAVE APPROVAL

Canadian pulpwood dealers have had their attention drawn by the Dominion's Wartime Prices and Trade Board to the Board's order of last January which ruled that pulpwood contracts in any province, east of Alberta, must be governed by Timber Administrator A. S. Nicholson.

Under this order, which many dealers have not adhered to, the terms of every agreement or commitment for the sale, supply, or delivery of pulpwood in any part of Canada, east of Alberta, made on and after December 1, 1941, must be submitted to the timber administrator and approved by him before the contract or commitment becomes valid and binding.

◆

NEW POST CREATED BY GOVERNMENT PRINTING OFFICE

The unprecedented rush of printers to Washington seeking contracts has made it necessary for the Government Printing Office to create the Office of Consultant on Commercial Purchases. This office will be filled by Eustis E. Morsberger, who has been employed in the Government Printing Office since 1939, before which he was printer, proofreader, and head reader on the *Baltimore Morning Sun* in Baltimore for twenty years.

Mr. Morsberger's duties will consist of receiving and interviewing all callers at the Government Printing Office who desire to see the Public Printer, the Deputy Public Printer, or any other official or employee of the Office with reference to the possibility of procuring contracts for printing and binding, or for equipment and consumable supplies.

BRIEFS

▶▶▶ A PLAN FOR REWARDING employees for efficiency ideas applicable in their work has been inaugurated by the National Paper Products Company of Carthage, New York. Awards are made on a quarterly basis to those submitting the best ideas during the preceding quarter. All awards are in the form of War Stamps.

◆

▶▶▶ FIRE DESTROYED a warehouse of the Acme Paper Board Company, Glenside, Reading, Pennsylvania, April 8. As the warehouse was of stone construction with a wooden roof and contained only a few rolls of paper at the time of the fire, damage to the building and its contents amounted to only a few thousand dollars. The property was formerly the Bushong Paper Mill. The main plant of the Acme Company a half block away was not damaged.

◆

▶▶▶ THE GOVERNMENT OF EL SALVADOR, in order to aid newspaper publishers, has issued a decree permitting the import of newsprint in rolls duty free. This measure is designed to offset the rise in price. Newsprint paper in sheets continues to be dutiable at the rate of $1.20 per 100 gross kilograms.

◆

▶▶▶ AFTER OCCUPYING THE SAME location in Minneapolis, Minnesota, for the past nineteen years, the offices of the Minnesota and Ontario Paper Company, including those of its Insulite and other divisions, will be moved to new quarters on the fifth floor of the Baker Building, Second Avenue and Seventh Street, about June 1.

◆

▶▶▶ PLANS FOR A PROPOSED wharf and a description of the site have been deposited with the Minister of Public Works at Ottawa and in the office of the District Registrar of the Land Registry at Tadousac, Quebec, by the Anglo-Canadian Pulp and Paper Mills, Ltd., Quebec City. The wharf, consisting of wharf approaches, wharf, break-waters, and deep-sea channel, is to be built at Forestville, Quebec, near the mouth of the Sault-au-Cochon River on the north shore of the St. Lawrence River, on the water lot leased by the company from the Quebec Government.

...to help a mill in distress

TIME . . . 1938

PLACE . . . a mill 200 miles from Middletown, Ohio

CALAMITY . . . a broken gear on a dryer section, causing shut-down.

SOLUTION . . . Shartle was called on to help but no record of gear in Shartle file. So Shartle sales engineer left Middletown at 6:00 P.M., arrived at mill at 12:00 Midnight, on way back by 2:00 A.M. Gear in production 11:00 A.M. next morning.

That's service . . . but here's the really important point to this story, and it happened three years later.

That same mill telephoned and a frantic voiced called, "Say, do you fellows have a pinion that will work on our dryer section? The dang thing just broke and we are desperate."

Well, we didn't know right offhand and we visualized another 400-mile ride to get more data. But we checked up . . . and found (now get this) that when our engineer was at this mill before, he had also checked the pinion as well as that gear, thinking that some day the information might prove useful.

Shartle makes it a policy, not only to give service in emergencies, but to look forward to possible *future* misadventures. Remember, our engineers are still eager to serve you during the duration.

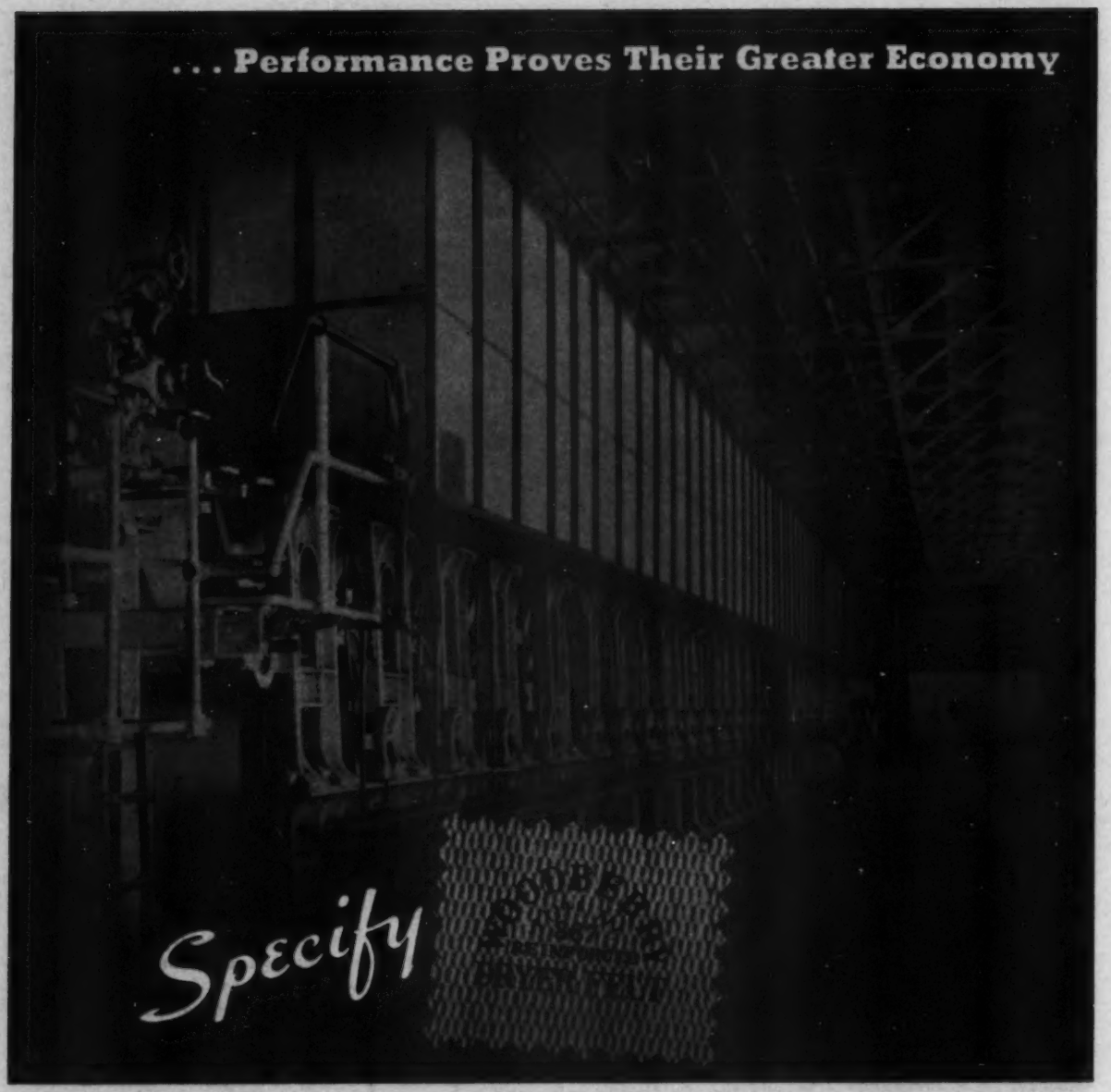
CALL MIDDLETOWN 2-4561

SHARTLE BROTHERS, Middletown, Ohio

Division of the Black-Clawson Company.

SHARTLE BROTHERS

. . . Performance Proves Their Greater Economy



The face of a dryer felt takes the hardest beating. Adequately and properly protect this contact surface and down go dryer felt costs. That is the whole principle behind the patented feature of WOODBERRY 887 reinforced dryer felts. Asbestos yarns woven at scientifically determined intervals into the face of WOODBERRY 887's provide them with many long hours of extra wear. WOODBERRY 887 dryer felts have been setting so many records for longer and more efficient service in so many branches of the paper making industry that their greater economy is now an established fact. Specify WOODBERRY 887's. Experience the satisfaction of attaining maximum dryer felt efficiency with lower dryer felt cost.

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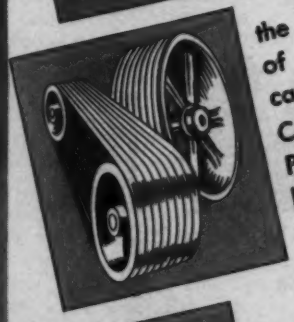
for PEAK PRODUCTION WITHOUT INTERRUPTION



POWER TRANSMISSION has a lot to do with achieving the maximum output without interruption that is so very necessary today. Having experience accumulated from 85 years of specialization in the development, design, manufacture and application of successful power transmission equipment, Wood's can give you the products . . . the service you want. Covering almost every transmission need, Wood's Products deliver the utmost in economy, efficiency and long service life.

It will pay you to investigate the many savings the Wood's Long Life Line offers. Write today for more information, or ask for our catalog number 82.

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PAPER MILLS!

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Converts corn or tapioca starch into the most economical tub or calendar sizing a paper mill can use.

Samples and complete details on request.

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230 Park Avenue, New York City

Editorial

The War Must Be Won!

▶▶▶ A TEMPORARY SLOWDOWN in demand for paper products generally, and of printing papers in particular, became apparent during March and April. However, this slowdown is the result of an inevitable readjustment in buying and inventory conditions, and on the whole will prove beneficial, clarifying, and make for a better stabilization of operations in the industry in the future.

Following the Pearl Harbor disaster and the active entrance of this country into War with the Axis in December, there was a considerable amount of hectic buying of all paper products both for Government consumption and civilian needs which resulted in compartively heavy increases of inventories after the first of the year.

Then, faced with the rulings against heavy inventories by the WPB and the heavy income taxes, the civilian holders of paper products slowed down on purchases and speeded up liquidation of stocks. Concurrently, a period of reorganization in the WPB personnel and practices, particularly in the Pulp and Paper Branch, and a curtailment of buying by many other governmental departments, the slowdown became widely manifest in the past two months.

These contracurrents in the trade made for uncertainties and confusions and introduced a period of cautious proceedings which has not been apparent since the defense program became active about a year ago.

In the meantime, the reorganization of the Pulp and Paper Branch of the WPB has been completed. The new director has taken charge. The Pulp Allocations Committee of thirteen selected members of the industry has been appointed and gone into active work. This committee's first report on allocations probably will be forthcoming on or about the fifteenth of May, and its findings will without doubt constitute a strong stabilizing influence on all future operations.

All excess inventories in both governmental and civilian hands have been materially reduced. A secondary vacuum in stocks on hand will appear shortly and no future accumulations of paper products inventories will be possible again for the duration of the War.

In addition, there now seems to be a rapidly growing conviction among all divisions of industry that we are in the War up to our ears and that it must be accepted seriously and speedily by everybody if we are to win.

The outstanding fact is that the Government of these United States is the sole and only Big Business Corporation in the world today. It is the sole and only big industrial and business corporation on earth, supplying 72 per cent of the world's area and 64 per cent of the world's population with goods they must have to keep them functioning in this War.

This United States Big Business Corporation controlling every industry and every line of business endeavor is at War, and every man or woman working therein, is at WAR just as certainly as is every soldier, sailor or aviator. The only difference is in the kind of service, but it requires the sum of all service to complete the functions which will deliver the knock-out to our enemies.

The paper industry is an essential function in the war program. The temporary slowdown in demand will give way to a steady, expanding, stabilized demand for paper products for war purposes. The necessary provision is to see to it that the production processes of the industry are directed or converted into products needed for the successful prosecution of the War. The industry's operations will expand. *The War must be won!*

A Better Job of Conservation

▶▶▶ MUCH PROGRESS has been made by the pulp and paper industry as a whole in minimizing wastes from its mill operations. Not so many years ago, a closed system in a paper mill was unknown and tons and tons of fiber as well as valuable non-fibrous materials went to mill sewers every day. Likewise, little, if any, use was made of the heat of the chemical recovery operations of a sulphate mill until comparatively recently.

Now the recovery of fibrous and non-fibrous materials in paper mill white water is common practice. Likewise, the modern sulphate pulp mill generates a good portion of its power and process steam requirements from the heat incident to the chemical recovery operations.

White water losses and waste heat, therefore, are two terms common to the pulp and paper industry which have come to take on quite a different significance during the past few years than formerly.

Numerous other advances in technology could be cited, but, in each case, the result would be the same: namely, an economic advancement through the conservation of what previously was a waste product.

Such technological advances are only part of the progress made in conservation of materials by pulp and paper mills. An equally important job has been done in increasing the life of machinery and equipment through better selection of materials of construction, better operation, and better maintenance.

Today, with the energies of our Government devoted to the winning of the War, it is imperative that the pulp and paper industry as a whole do even a better job of conservation than it has done in the past. It is essential that the industry conserve materials perhaps to the point of hurting. Important as pulp and paper is to the war program, the needs of the armed forces are paramount and rightly take precedence over every domestic requirement. Better management control and more efficient production is a challenge to the industry. In the acceptance of this challenge is industrial opportunity for today and industrial security for tomorrow.

Current Thought

PROBABLY WHAT *You* HAVE BEEN THINKING, TOO

WILLIAM SIBLEY

▶▶▶ AMONG THE READERS of THE PAPER INDUSTRY AND PAPER WORLD there are few advertising men, and so, probably very few who receive and read regularly that very fine weekly journal published for the advertising fraternity called *Printers' Ink*. For this reason I want to give you the pleasure of reading a little page article entitled "After Hours," penned by W. J. Weir, Copy Director of Lord & Thomas, which appeared in one of the issues of March, 1942. Here, in well-turned phrases is something that will give you pause, food for thought, and the opportunity to say: "He's got something there! . . . Because that's the way *I* feel, too." So, without further introduction, I quote Mr. Weir's article:

"AFTER HOURS"

"Don't get me wrong—I'm just an ordinary guy. I'm not trying to pass as an expert on the moulding of public opinion. I'm not talking big about what I'd do if it were my job to whip up the country on the war effort.

"I'm talking as an average citizen. I'm saying, not what I'd like to *tell* them, but what I'd like to be *told*. Soon.

"Because I'm concerned, and I've been concerned, about my reaction to all that's been happening. Sure, I'm buying bonds. I'm paying taxes. I'm doing with less sugar.

"But deep down inside, down where it really matters, something hasn't taken place yet that I feel ought to take place. I'm all a welter of confusion there. It keeps me scratching my head and mopping my brow when I know I ought to be clenching my fists.

"You understand? It's like this:

"I want to be told not to buy Defense Stamps or Defense Bonds. I want to be told to buy Victory Stamps or War Bonds.

"I want to be told not about the construction of houses in Defense Areas. I want to be told about the construction of houses in War Production Areas.

"I want to be told—not to Remember Pearl Harbor. I want to be told to take Tokio, to bomb Berlin, to raze Rome.

"I want to be told—not to do my part to keep Naziism or Fascism from these shores. I want to be told to do my part to spread Americanism to all shores.

"I want to be told—not to help keep our world and our way of life from being lost. I want to be told to help build a new world and a better way of life.

"I want a positive program instead of a passive one. I want something to fight for—I'm sick and tired of having only something to fight against. I'm hungry for something to get pepped up about—I'm repelled from having only something to fear. I want something to do—not just to wait for.

"It hasn't been so long since the last war that I forget what happened then. I remember the parades and the speeches and the ringing slogans. Then we fought to make the world safe for democracy. We bought Liberty bonds. We sang that the Yanks were coming.

"We set out to avenge Belgium—not just to remember it. We made a vow that we'd reach Berlin or bust. We toyed with plans to hang the Kaiser. We warned the Hun to 'keep your head down, Fritzie-boy!' We girded ourselves for a Crusade—we didn't close the doors for a siege.

"We hated the Kaiser—we didn't laugh at him. We printed his loathsome physiognomy on toilet paper—to me the most ignominious use of it. We likened his upturned handle-bars to the devil's horns—not to anything so harmless and pathetic as the famous hirsute prop Charlie Chaplin plasters on his upper lip. We saw nothing to be amused about in his vain and pompous posturings—as we do today in Mussolini's puffing and strutting. We didn't pin our hopes on the defective eyesight of our enemy.

"We planted war gardens. We poured our money into war chests. We had gasless Sundays and yelled *'Slacker!'* at anyone who dared to venture out in his Winton or Hupmobile or Stearns-Knight. We churned one pound of butter into two pounds and did it with as much will as if we were turning out ammunition.

"We took the offensive psychologically long before we took it physically. And don't tell me we can't do the same now.

"I want to sing that today we control our own destiny, tomorrow the destiny of the whole world. I want to sail against Germany, against Italy, against Japan. If they can sail against us and our allies, why can't we sail against them?

"I want to construct a great America co-prosperity sphere. I want to correct the mistakes of the Versailles treaty insofar as they allowed all this to happen. I want to win lebensraum for the democratic way of life.

"I'm fed up with singing plaintive songs—I want to sing battle songs. Don't tell me 'there'll be bluebirds over the white cliffs of Dover.' To h—— with bluebirds. Tell me there'll be vultures and deathly silence over Berchtesgaden.

"I'm bored with keeping a stiff upper lip—I want to develop a stiff uppercut. I'm tired of being made to feel sad. I want the experience—the purging, marshaling, driving experience—of being made to feel mad. *Fighting* mad!

"You get me?"

PRODUCTION in full Gear...

WE SERVE YOU with a plant, a product, and a personnel. But we also serve you with assets equally important — the largest plant in the world devoted exclusively to the manufacture of mechanical rubber goods. The plant consists of 23 separate buildings covering 15 acres of floor space, with the most complete modern equipment, some of which is duplicated nowhere else, and with its own brass foundry and power house.

The product is built to unswerving standards in material and workmanship, and has long maintained an enviable reputation.

In addition to the repeated contributions to the rubber industry in epoch-making inventions and improvements we pledge a steadfast resolution to continue to deserve the confidence which for more than 60 years you have placed in us.

BOSTON WOVEN HOSE AND RUBBER COMPANY

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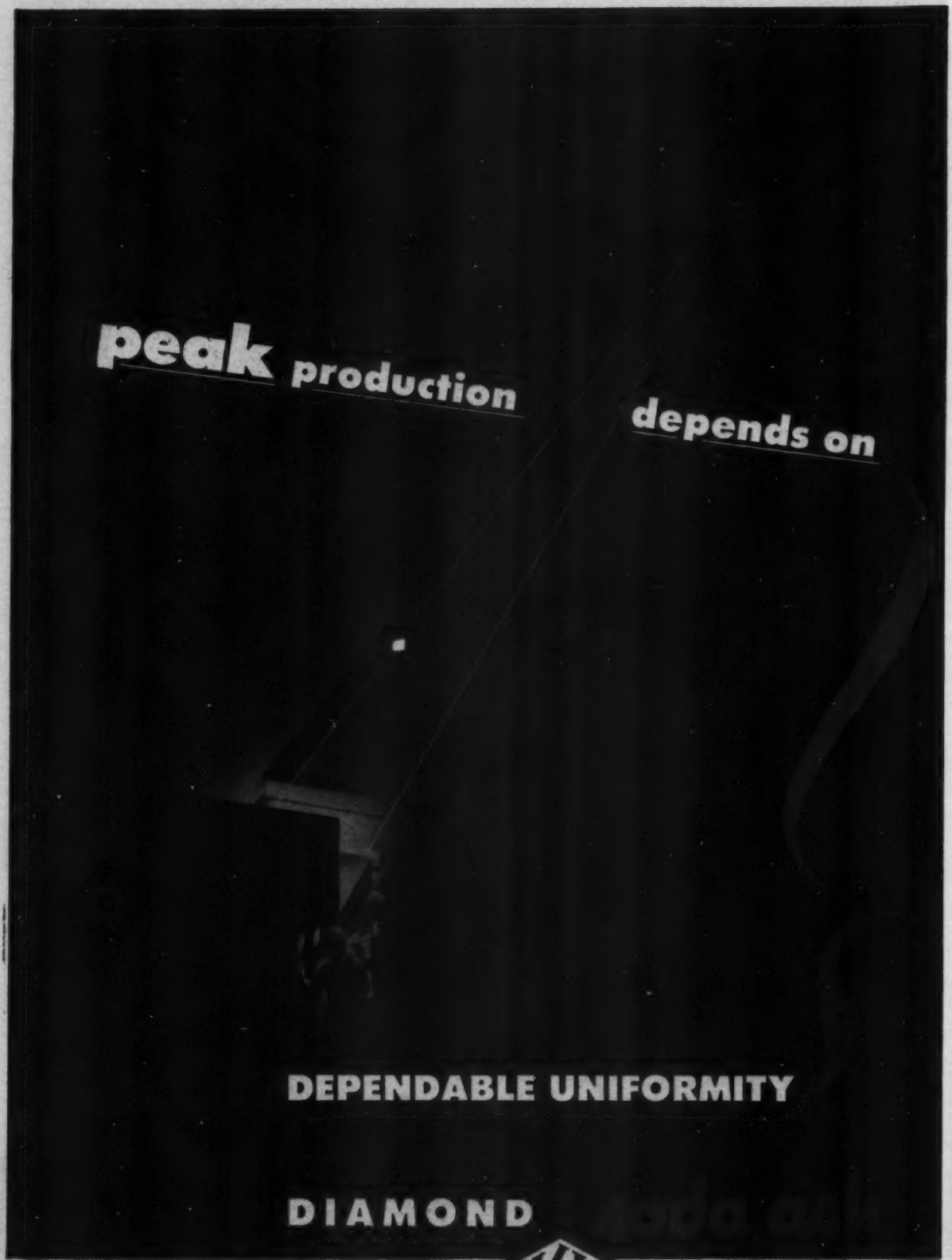

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NO CLOGGING WORRIES HERE!

And that means plenty these days when every possible efficiency is vital to keep paper costs down! Buffalo *Paper Stock* Pumps are daily insurance against costly pump failure and delays. That's because of the Buffalo design—these smooth operating, full ball-bearing pumps with their special non-clogging impellers sail right through the most difficult stocks—deliver the goods regardless of those serious changes in consistency. Yes, it pays—and keeps on paying for years—to trust stock pumping to Buffalo Pumps.

"Buffalo" PAPER STOCK PUMPS

BUFFALO PUMPS, INC.

213 Mortimer St. Buffalo, N. Y.

Branch Engineering Offices in Principal Cities
Canada Pumps, Ltd., Kitchener, Ont.

THEY ARE SHEARING the sheep close to the skin nowadays. Rationing the wool for all non-essential purposes, too. Coats are shorter. No flaps to pockets. No cuffs to trousers. No pleats to skirts.

But there is no skimping of wool for Hamilton Felts. Priorities take care of that. Your paper machines must run overtime, over-speed and at top efficiency. They must be equipped with felts of the best wools, to remove the most water and save steam at the driers.

Hamilton Felts do just that. We have the best of wools and the know-how to weave, full and finish them the best way for your particular type of paper machine and your special kinds of paper or board. Keep your presses properly adjusted — rolls free from crumbs. Hamilton Felts have the guts. Treat them right and they will last longer.

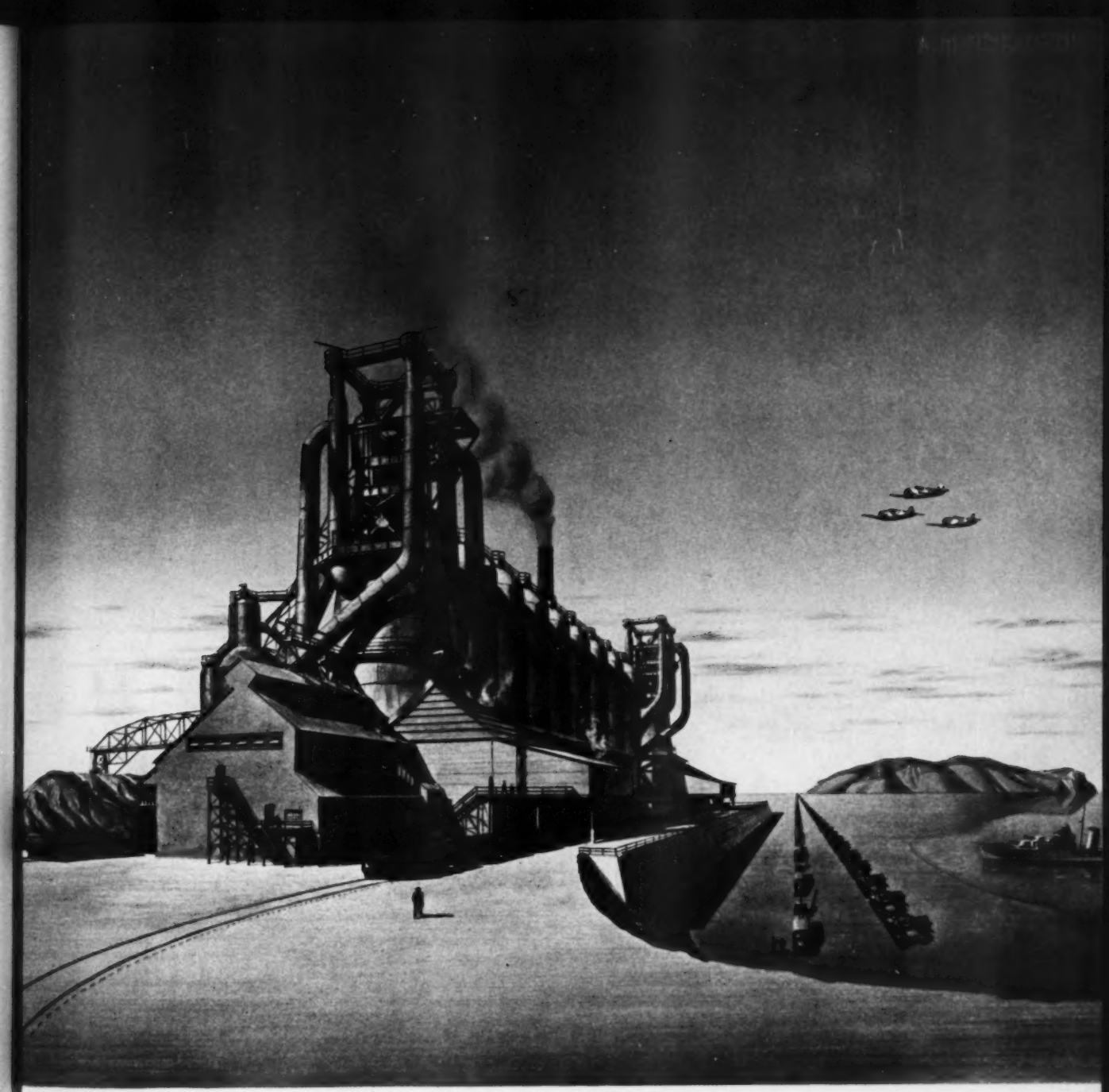
From the thinnest tissue to the heaviest board there is a Hamilton Felt that will do your work better, faster and at lower cost.

SHULER & BENNINGHOFEN, HAMILTON, OHIO

• Miami Woolen Mills •

Hamilton Felts

• Established 1858 •



Steel Is More Precious Than Gold

At the most critical moment in our history, we bury our gold in some mid-western field, and work frantically to produce more and more of the steel which is far more precious to us *now*, than gold.

This is a *steel* war. The greatest hope of mankind is the fact that America alone can produce 50% *more* steel than all the Axis-dominated countries.

The process of steel-making starts at the blast furnace, and a blast furnace needs enormous quantities of coke. Censorship forbids us to tell how greatly coke production has been increased with new Koppers coke ovens, but it is a heart-warming figure.

These ovens convert millions of tons of coal into coke, gas and other products, vast quantities of which are further processed by Koppers into chemicals used in the explosives, plastics, synthetics, rubber, dyes and drugs now so important to military success.

Among the many products Koppers has furnished for years to the steel industry are Fast's self-aligning couplings; special D-H-S Bronze for gears, slippers, segments, housing nuts, and bearings; iron gate valves; pressure-treated ties and timber; roofing, waterproofing and road materials; piston rings; deodorants and disinfectants.

These products help make it possible to produce ever-increasing quantities of steel for tanks, guns, planes, ships and munitions. *It's up to American Industry.* Koppers Company, Pittsburgh, Pa.

KOPPERS

THE INDUSTRY THAT SERVES ALL INDUSTRY

BUY UNITED STATES WAR BONDS AND STAMPS

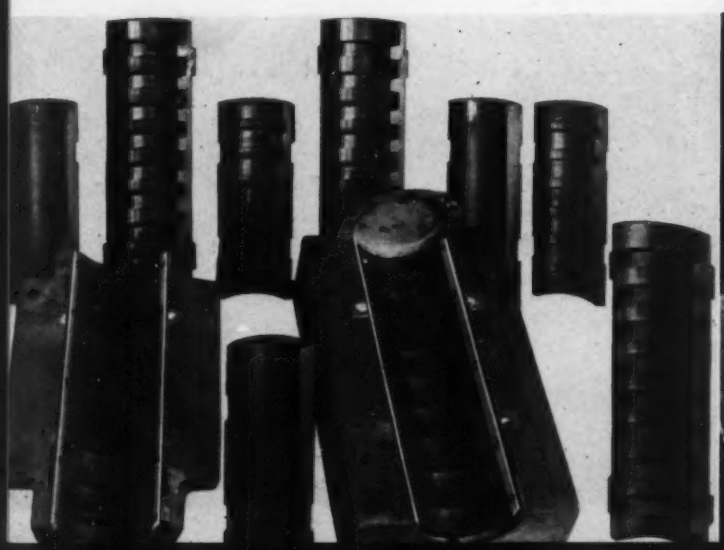
Help Conserve oil grease and Restricted Metals

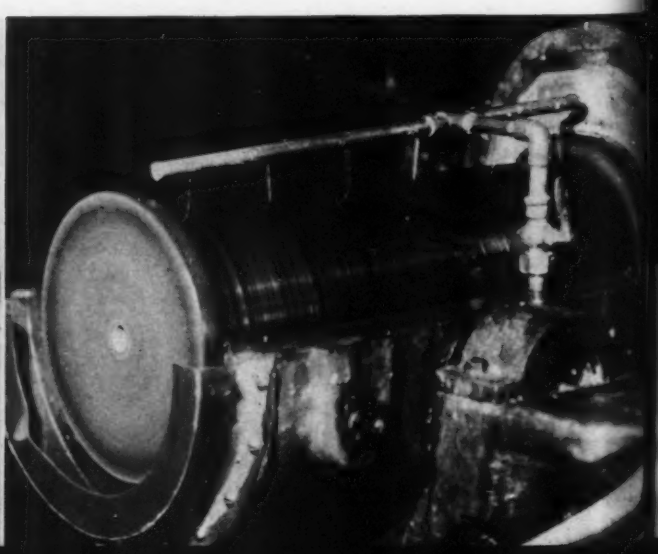
Use Ryertex Bearings

— they're Non-metallic and Water-lubricated

In addition to substantial savings in lubricating materials, mill operators report that water-lubricated Ryertex Bearings reduce power consumption and assure a cleaner, safer mill. They eliminate the possibility of accumulated oil and grease finding its way in the paper and give longer bearing life.

Write for illustrated bulletin giving complete details and case-studies of Ryertex installations on Beaters, Jordans, Presses, Rotary Screens, Agitators, Grinders, Calendars, Pumps, etc. Joseph T. Ryerson & Son, Inc. Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Philadelphia, Jersey City, Boston. In Canada: 5255 Cote St., Luc Road, Montreal.





Longer Life for

Industrial Rubber Products

H. A. EVERLIEN
Mechanical Goods Division
United States Rubber Co.

▸▸▸ THE INDUSTRIAL RUBBER PRODUCTS in use in paper and pulp manufacturing plants of the nation represent a large item in the Government's conservation program. Many of these rubber goods can be produced only under strict quotas. None could be replaced without drawing from the country's limited rubber stock pile. Accordingly, paper manufacturers are wisely asking how to take care of their industrial rubber products in order that they may last as long as possible.

Extra care in the storage, handling, and use of rubber goods will be of great service to our country, and at the same time it will reduce your costs of maintenance and production.

Speaking generally, rubber has several natural enemies which are always ready to destroy it if given the chance. These include oils, greases, solvents, concentrated acids, extreme heat, dryness, sunlight, and ozone. In combination, their separate destructive actions are often accelerated.

Other substances which may not be harmful to rubber itself lie in wait to attack cotton, duck, metals, or other materials which are combined with rubber to form certain mechanical products. Some of these substances are: water, mildew, alkalies, dilute acids, and many gases.

All products containing rubber must be protected against these enemies.

Rubber-Covered Rolls

The rolls used by the paper industry are covered with high grade rubber. Through proper care the life and performance of these rolls can be increased considerably.

When selecting rolls, be sure that each roll has the proper density for its particular service. A roll that is too hard will have a tendency to crack; one that is too soft will corrugate.

In storage, rubber-covered rolls should be kept in a dark place in a temperature between 50 and 60 Fahr. During the period of storage, rolls should be revolved through 180 degrees each week to prevent permanent deformation.

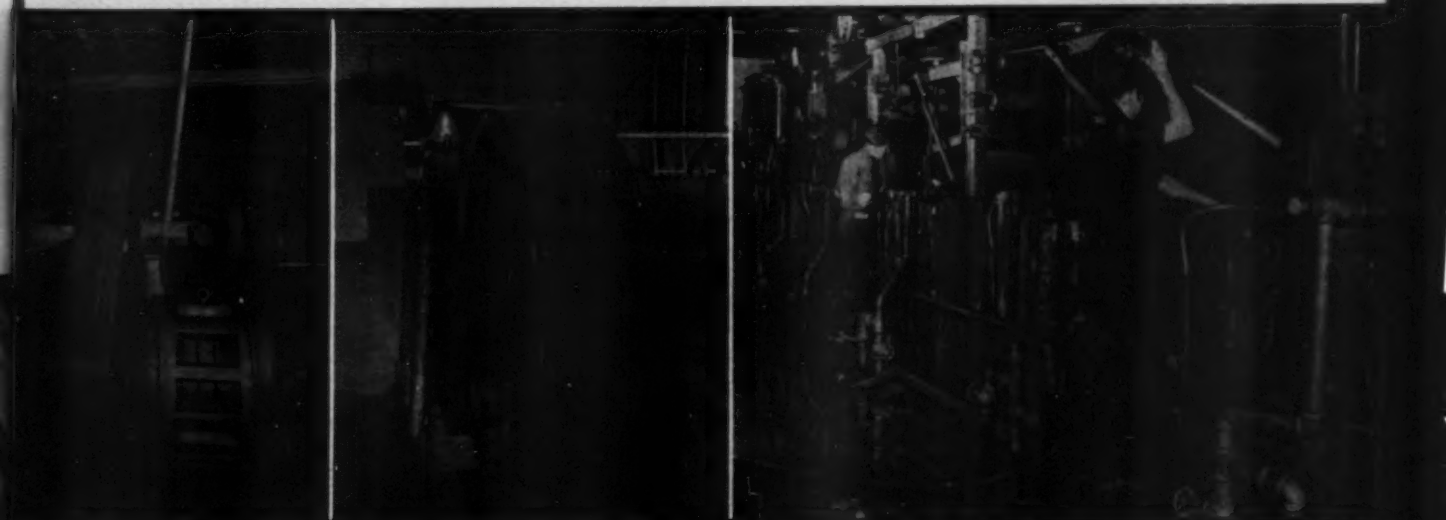
A roll should never be allowed to rest on its surface because this eventually will cause a permanent flattening at point of contact. Instead, keep the roll in its box or provide a rack in which the roll will be suspended from its journals.

The surface of a roll that is kept in storage any appreciable time tends to oxidize and harden. Therefore, that roll will require regrinding before it goes into service.

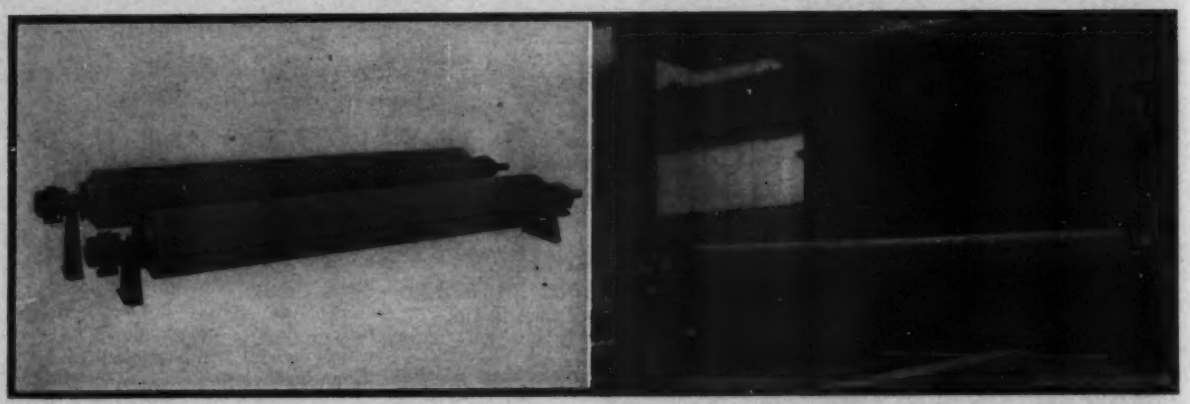
When moving a roll in and out of position, great care should be taken to avoid damage. Use carefully adjusted slings attached to journals. Be sure the slings do not touch the rubber covering. Tools of any kind should be used with the utmost care. Even small quantities of oil or other petroleum products should be kept from contact with rubber rolls.

Rolls should be kept ground and properly crowned. At the first sign of corrugation or unevenness they should be removed for regrinding.

Watch the pressure. It should never be more than required for effective performance. Always see that lever weights are properly adjusted. Excessive or irregular pressure will shorten the life of a roll.



LEFT—This belt is running over the edges of the pulleys, apparently because of their misalignment. Conditions such as this should be corrected to avoid damage and premature belt failure. On some drives, misaligned pulleys cause the belt to rub against adjacent objects resulting in serious damage to the belt edges. CENTER—Contrasted with the drive shown at the left, the belt on this beater drive is nicely centered on the pulleys and is transmitting full power uniformity. RIGHT—Hose, rolls, boots, packings are but a few of the many items in which rubber is used in American paper mills. Each item in itself may seem relatively trivial. But all of the rubber in all rubber products used in all mills adds up to a sizable amount. Increasing the useful life of each through common sense care will result in substantial savings of rubber . . . vitally needed for the nation's fighting forces.



LEFT—When off the machine, rolls should be suspended from their journals on racks such as these . . . never allowed to rest on the rubber. RIGHT—Handling rolls this way eliminates danger of damage to rubber or journals. Note how wooden blocks are used to keep the sling from touching the rubber . . . also how journals are padded where sling is attached.

Rubber-Lined Equipment

Rubber lining of tanks, pipe, fittings, agitators, and washers represents an important item in conservation of industrial materials. This applies to manufacturers of bleached paper stocks.

In the planning which precedes the actual installation of rubber-lined equipment, be careful to give the rubber manufacturer full and accurate information concerning the service conditions to be encountered. Specifications for rubber linings for very similar processes may differ appreciably, and the life of a given installation may depend greatly on the original data given to the manufacturer.

Efforts to increase production frequently result in higher operating temperatures or higher chemical concentrations. If production is being pushed, investigate the possible effects of these proposed higher temperatures or chemical concentrations on any rubber-lined equipment which may be in the flowsheet. High temperatures and concentration of chemical reagents generally shorten the life of rubber, and under certain chemical conditions a small temperature increase may carry the solution beyond a safe operating point; the result is rapid failure of the rubber linings.

A supplementary inner lining of brick and acid-proof cement which will create a temperature gradient between solution and rubber lining often makes possible the use of rubber under conditions it could not stand without this protection.

Possibly shortages of raw material are making it necessary for you to use substitutes or to change your processes. Either of these things may result in a radical change of operating conditions for some or all of your rubber-lined equipment.

Increases or changes in production which in themselves might not jeopardize rubber linings may possibly result in an increased concentration of impurities or in the production of new impurities detrimental to rubber.

If any of the above changes are necessary or contemplated, it is advisable to discuss with the rubber manufacturer the probable effect of such change on the life of rubber linings.

Rubber-lined valves should not be closed under excessive pressure since this tends to loosen and destroy the lining.

Operators making routine examinations or cleaning rubber-lined tanks should protect the linings from wear or cutting by wearing rubber-soled shoes.

Points of lubrication on adjoining or overhead equipment should be protected so that lubricants will never drop into the tank or be brought into contact with the rubber lining.

Any damage which accidentally may occur to rubber linings must be repaired at once, and periodic examination should be made so that even the smallest cut will be discovered quickly. This will not only protect the lining against further damage but also will protect other parts of the equipment.

In warm climates where steel tanks have large surfaces exposed to direct sunlight, dark colored paint will cause them to absorb surprisingly large quantities of heat and the operating temperature of the rubber lining will be unnecessarily high. Paint such tanks with light colors which will reflect a large proportion of the sun's heat.

Idle Equipment

If rubber-lined equipment is to be out of service for any length of time, submerge the lining in dilute acid solution. Dry air, sunlight, and heat are very detrimental to unprotected rubber linings.

Rubber-lined valves which are to be idle should be opened, removed from the line, and carefully cleaned.

Rubber Belting

Rubber belting required in the paper industry for power transmission, for conveying chips or wood pulp, or for other purposes, will give many hours of added service through proper care.

Observe the same precautions in storing belts that are taken with all items of mechanical rubber goods. In other words, choose a cool, dry location, away from sunlight or ozone-producing electrical discharges.

Installing Transmission Belt

Use extreme care that the ends of the belt are cut absolutely square. Be sure to use the correct type of belt fasteners.

Be sure to arrange the drive so that the belt runs fully on all pulleys and does not run over the edge of any of them.

Adjust tensions carefully to avoid over-stressing the belt. A too-tight belt not only destroys itself quickly but at the same time ruins bearings, and throws unnecessary strain on other driving equipment.

Caring for the Belt

Make careful periodic examinations to be sure that belt tensions are kept as low as possible, consistent with efficient driving, and at the same time check the alignment of shafts and machines which may change if buildings settle.

Use no belt dressings since they contain oils which are injurious to rubber belting. In fact, exercise continuous care that oils and greases of all kinds do not come in contact with the belt. If belt surfaces become contaminated with dust or other material, or swollen with grease, they should be washed thoroughly with common yellow laundry soap and water.

Wait until machinery stops before removing belts from drives. Often, the practice of throwing belts while

they are in motion results in sharp twists or bends under tension which will prepare the belt for an early breakdown. Throwing belts is also dangerous to the workman.

Conveyor Belts

Careful handling of the belt during installation will pay large dividends in trouble-free service. Be particularly careful about creasing, folding, straining, or subjecting the belt to sharp bends which may break the carcass and lay the groundwork for future failures.

A conveyor installation should be designed to operate at a proper speed to insure a full, uniformly distributed load on the belt. Thus, wear will be distributed equally across the belt, and, since wear on the belt cover is due largely to abrasion at the loading point, this is proportionately less with respect to tonnage handled when the belt is fully loaded. The result is a greatly increased tonnage life as compared to that of an underloaded belt traveling at a higher speed.

Mechanical feeding equipment and a well designed surge-bin arrangement are the best means of accomplishing the desired, uniform feed.

Care should be taken in the selection of pulley sizes since the diameters over which belts must pass have a great effect on the length of their life, small pulleys being detrimental to flexing life of the carcass. Usually a minimum of five inches of pulley diameter per ply is considered good practice.

Lumps or quantities of moist, sticky material should be prevented from falling to the pulley side of the belt where they may inflict severe damage when passing around the pulleys. Keep pulleys clean.

Better than side guide rollers are self-aligning idlers which can be used in unusual circumstances. Ordinarily, if conveyors are installed with all pulleys and idlers square to the center line, and if a belt of the proper flexibility for perfect troughing is used, and if material is loaded evenly onto the belt, it will train perfectly without external control devices.

Spacing of idlers should be arranged so that belt receives ample support.

Maintenance of the Belt and Equipment

Inspect belts regularly for damage to the cover and see that even the most minor cuts are repaired promptly. Moisture, acids, and fine materials gaining entrance to the carcass frequently cause serious unseen damage. Self-vulcanizing cement and plastic rubber compounds are available for making entirely serviceable repairs.

By the use of small portable electric vulcanizers more permanent repair jobs can be effected and in some cases even new patches of fabric can be cured into place at damaged spots by experienced workers.

Inspect all idlers regularly to be sure they turn freely. A frozen or hard-running idler can cause severe belt wear and can make belts run out of line, or fail to carry their load properly.

Lubrication of idlers should be performed only under a strict schedule and with the greatest care. Besides causing damage to antifriction bearings, too much grease will overflow any type of bearing and will come in contact with belt covers, causing serious injury. If the belt operates in a place where the temperature is high, or sunlight direct, this action is, of course, greatly accelerated.

Belt fasteners should be watched carefully. Loose, broken, or badly worn ones should be replaced immediately and all fasteners should be kept well tightened. A loose or broken fastener can tear a belt for its entire length.

Conveyors should be covered or completely housed for protection against weather of all sorts, particularly sunlight, which is extremely hard on rubber. However, housing should be such that belts and idlers are always accessible for inspection and repair.

Hose

The paper industry uses rubber hose for many purposes—water hose for both hot and cold water, acid hose, suction hose, grease and fuel hose, and cotton fire hose or mill hose.

While each length of hose may seem to involve a relatively small amount of rubber, all lengths of all types added together, would make an appreciable rubber stock; and increasing the life of each length will result in substantial savings in rubber.

When you receive a shipment of hose you will find that it has been carefully packed by experts so that it will reach you in top condition. Unpack it carefully, too. If you do, it will start its job with you in the same fine condition as when it left the factory. The unkindest cut of all is one inflicted on a new piece of hose by a grab hook, knife, pinch bar, or chain before it has a chance to *start* on the important job ahead of it.

Like all other rubber products, hose gives better service when stored in a place away from sunlight, heat, and ozone. Place your mechanical rubber store room away from generators, electric motors, boilers, and steam pipes.

LEFT—Neatly coiled hose, out of the way of traffic, is evidence of thoughtful care of all rubber products in this mill. Equally careful attention has been given the couch rolls shown above. Frequent examination and timely grinding have resulted in more than 12 years of excellent service. RIGHT—Proper crowning is an important point of the factory inspection of rubber covered rolls before shipment. When in service, rolls should be inspected frequently for maintenance of crown as well as for any signs of checking, corrugating, or loss of concentricity. Timely grinding, resulting from inspection, saves rubber in the long run.

Hose with fabric covers will mildew if kept in a damp, musty place. Mildew works fast, sapping hose strength.

Always coil hose on a floor, if it is dry, or on a shelf or other flat surface. If hung on nails, hooks, or brackets, the strain will weaken it.

Do everything possible to prevent trucks or other heavy vehicles from running over hose and avoid dropping heavy tools or other objects on it.

Be sure that valves are provided at the intake end of all the hose lines in your plant so that the flow of material through the hose can be stopped at that point. Most hose is designed to stand up to the strains involved in the normal passage of substances through it. Shutting off this flow by kinking the hose or by closing it off at the discharge end is often what causes premature failure of a healthy piece of hose.

Hose that is fabricated for hard service has all the qualities necessary for such service and maximum endurance provided certain good usage practices are applied. Ordinarily, outside wrappings of wire, armor, or rope are unnecessary since the cover has been compounded to resist abrasion for as long a time as the other parts of the hose will resist what *they* have to put up with. Such protective devices are frequently quite hazardous and they always render hose bulky and difficult to handle.

When coupling hose, the first thing to ascertain is whether the couplings are the right ones for the job.

Have all couplings carefully inspected before installation to see that burrs, serrations, and other sharp edges are not present. If they are, they should be carefully smoothed off with a file. Cuts and gouges in hose tubes usually don't show up right away. But they always reduce service, sometimes quite seriously.

Where couplings are tight-fitting, soap or rubber cement can be used as safe lubricant. Never use grease and never ream out the hose to accommodate the fitting. Place the coupling in a vise and force the hose straight over the sleeve. Never drive the coupling in with a hammer or mallet.

Seat or socket type couplings require that the hose be absolutely square on the ends. Otherwise, a fluid can leak in between the outer and inner sleeves and wick its way into the carcass of the hose. This can make the highest quality hose fall apart.

This same wicking trouble is sometimes encountered where materials are being conducted through a hose which is submerged in a liquid. Hose for such service should be ordered with "rubber capped ends" to guard against damage.

Water Hose

See that water hose is provided in ample length for the job it has to do. Stretching hose to make it reach, oddly enough shortens its service life. Bending, kinking, or dragging such hose over rough surfaces and allowing it to be crushed, are practices which can be avoided with a little care.

Provide facilities so that water can be cut off at the head end of the hose rather than at the discharge end. If the hose is being used out-of-doors, provide a reel on which it can be wound, and later stored in a protected location. It should be drained after use and put away where sun and weather cannot attack it. Never leave a water hose where water inside it might freeze.

Cotton Fire Hose (rubber lined)

Life of rubber-lined cotton fire hose will be improved if it is not stored near hot radiators or piping. If it is stored in a rack, use as few folds as possible and change their positions every three months so that the rubber lining will not be permanently strained at the folded points.

Every six months the hose should be removed from the rack, and water run through it; then it should be thoroughly dried again. This will keep the rubber lining from drying out.

When hose of this type is used at a fire, guard against chafing of the cover by vibration against the ground or floor. After use, the hose should be carefully examined, any oil or grease should be removed with a gasoline-dampened cloth, and the hose should be carefully drained and dried before being put back into storage.

A leaking stand-pipe valve where the hose is customarily connected will put the hose in danger of becoming waterlogged, frozen, or both. Such valves should be inspected periodically.

Keep this type of hose away from gasoline or its fumes because they may be absorbed through the cotton and loosen the adhesion between this and the rubber tube. This would make the hose unserviceable in time of an emergency.

Acids are particularly injurious to fabric-covered hose, and the two should be kept away from each other. If acids should accidentally come in contact with the cover of your hose, brush the spot lightly with a 5 per cent solution of washing soda and then wash the area thoroughly with clean water.

Mechanical Packings

The paper industry uses its share of both rod and sheet packings in connection with hot and cold water, steam, oil and air lines.

Mechanical packings involve many critical raw materials in their manufacture, such as rubber, cotton, asbestos, graphite, flax, jute, rayon, synthetic rubbers, wood fibers, lubricants, and many metals.

For this reason, packings, although a seemingly small defense item, should be used economically and properly cared for.

A careful choice of the packing to be used is perhaps the most important element in proper performance. At the same time, it is probable that much duplication of inventory could be eliminated by standardization on a relatively small number of types.

Centralization of packing storage would aid in standardization and would bring to light unknown cases of duplication, or near duplication, in inventory. And if all packings are stored at one point and one man made responsible, the stocks will be kept in better condition.

A cool place, free of dirt and grit should be selected. Racks or shelves should be provided so that sheet packings can be handled without danger of tearing. Other types should be purchased in strong, durable containers which will not only protect them from dirt and grit but will also prevent drying of their lubricants.

A more efficient use of sheet packing will be achieved if a control is arranged to see that only a sufficient amount is issued at one time for the particular job at hand. In fact, it is even better if gaskets can be cut in the warehouse where centers and ends can be saved for other use.

Preparation of Equipment for Packing

An examination of equipment before repacking often discloses worn, scored, or pitted moving parts, which are seriously reducing the life of the installed packing. Have such parts replaced or refinished and a remarkable increase in packing life can be expected. Maintenance of performance records often will indicate the need for such servicing. Also, it may bring to light situations where a seriously short service life is being obtained because the wrong packing is being used.

Electrical Wire, Cord and Cable

As a large user of electrical energy, the paper industry needs many types of rubber insulated electrical conductors.

Selection of building wire and many other wires and cables lies in the hands of the electrical contractor. Therefore, selection of the contractor is the important point. Be sure he is

capable, responsible. It may make a tremendous difference in the life of the materials involved in the job if the contractor uses precisely the correct specifications for everything.

Storage and Handling

Rubber-covered wires and cables should receive the same type of consideration during storage as rubber products of any type. Cool, dry, dark places away from sunlight and ozone are best.

When removing building wire from its carton do not cut a small hole in the center of the carton and pull the wire through it. Experience has shown that this kinks the wire, induces tension and stress in the copper conductor, and tends to break the dielectric or seriously impair its strength. The best system is to remove the coil of wire from the carton and unwind it, using a suitable reel if available.

Use of Wire

After wires and cables have been put into service, the most important safeguard lies in the fuse protection of the circuits they involve. Code requirements are correct and should be followed in all cases. Sometimes, however, when an important fuse blows, one of larger amperage is temporarily inserted and then forgotten. This leads to the possibility of overheated wires and reduced service life.

Mats and Matting

Large heavy mats should be moved carefully. Dragging them around by grasping the perforations on one corner or side will almost certainly deform them so they will not fit as intended, nor will they lie flat on the floor; they may be torn and ruined.

When mats are being put down, the area they will occupy should be carefully examined for stones or lumpy objects which may puncture or wear a premature hole through the mat if allowed to remain underneath. Any oil or grease on the floor should be carefully removed, and precaution should be taken to see that more of it does not get on the mat from the same source.

Mats should be cleaned very carefully and the use of destructive soaps and cleaners avoided.

Electrical Tapes

Rubber and friction tape stored in a cool, dark place will remain soft, pliant, and easy to use for a much greater length of time than those subjected to parching heat or direct sunlight.

Tape which is in the process of being used should be carefully rewrapped and put back in its original container to keep it in good shape until the last bit is used up. This will eliminate the throwing away of dried out, unserviceable remnants of tape.

Screen Diaphragms

Screen diaphragms should be inspected frequently and any small breaks or cracks should be immediately repaired. Edges of diaphragms should be secured at intervals of about one inch. If the edges are not secured at enough points, the resulting strain may tear the diaphragm from its fastenings.

Deckle Straps

Deckle straps are made from the highest grade rubber and should be carefully preserved. Very little rubber is being allocated for this product. Therefore, every possible care should be given to straps on hand. Any small cracks should be immediately repaired. Straps not in use should be stored properly in a cool, dark, and dry room, preferably in the original container and in such manner that they will not be kinked.

Handy Rules

FOR ESTIMATING BOILER EFFICIENCY

W. F. SCHAPHORST, M. E.

▸▸▸ BOILER EFFICIENCY is equal to heat output divided by heat input. If a fuel with a heat value of 10,000 heat units per pound is burned, and only 6,000 of those units are utilized, it is obvious that 4,000 of the heat units are wasted. Most of that waste goes up the chimney, and the boiler efficiency is 60 per cent.

It is plain, then, that if the amount of heat that goes to waste up the chimney can be measured, and if the amount of heat that is furnished the boiler in the fuel consumed is known, the efficiency of the boiler can be determined by simply dividing the heat output by the heat input.

The following rule for coal burning boilers is based on the above well known formula and on results obtained from many actual boiler tests: "Multiply the temperature of the chimney gases in deg. Fahr. by 625 and divide by the heat value of the coal in B.t.u.'s per pound. Then subtract the quotient from 100." The result is the approximate boiler efficiency in per cent.

For example, if the chimney gas temperature is 500 Fahr.; and the heat value of the coal is 12,000 B.t.u.'s per pound; it will be found that the boiler efficiency is 74 per cent.

For oil burning boilers the rule is: "Multiply the temperature of the chimney gases in deg. Fahr. by 5,000 and divide by the heat value of the oil in B.t.u.'s per gallon. Then subtract the quotient from 100." The result is the approximate boiler efficiency in per cent.

Thus, if the chimney gas temperature is 500 Fahr.; and the heat value of the oil is 160,000 B.t.u.'s per gallon; it will be found that the boiler efficiency is 84.5 per cent.

It should be emphasized that the above rules are based on good boiler operation. A "fake" result may be obtained by using so much excess air that your exit gas temperature will be low. Therefore to be sure that the amount of air supplied to the boiler is correct it is advisable to use a CO_2 outfit of one kind or another. It is exceedingly important to have the right percentage of CO_2. Then the rule that fits the case (coal burning or oil burning) can be applied.

In other words, the only special instrument that is necessary or desirable for making the efficiency test is a CO_2 outfit.

Silicates of Soda *in Pulp Bleaching and Other Paper Mill Uses*

C. H. JEGLUM
Philadelphia Quartz Co.

▶▶▶ WHEN THE FIRST RESTRICTION on the use of chlorine appeared it was evident that drastic changes in paper bleaching would follow. It was not apparent that within a few months the chlorine shortage would become so acute that the bleaching of sulphate and soda pulps would be very sharply curtailed and that of sulphite might have to be totally discontinued; yet even that may actually take place and no one knows when there will be sufficient chlorine to resume full operations.

During the first phase of the shortage when chlorine consumption was limited to 90 per cent of the normal requirements, someone remembered that years ago the effect of sodium silicate in hypochlorite bleach had been investigated in the laboratory of the Philadelphia Quartz Company. The findings, published in a paper by J. D. Carter (*Industrial & Eng. Chem.* p. 248, 1926) indicated that the presence of silicate in some way affected the activity of the hypochlorite so that better whiteness was produced by normal amounts of bleach and equivalent whiteness was obtainable by a combination of sodium silicate and a reduced quantity of hypochlorite. Papermakers, at the time, evinced little interest in the process, but in the bleaching of textiles, where the conditions were somewhat different, silicate of soda did find a place.

Carter's work indicated that the highly alkaline silicates were required for good results. Just why this should be is not evident, but it may be due to the fact that they form crystalloidal solutions instead of the highly colloidal solutions obtainable from the more siliceous grades. Whatever the cause, it is clear that the liquid silicate, B-W, with a soda-silica ratio of 1:1.6 was most satisfactory but there was also evidence that a metasilicate, if it were available, also would be useful. Since then the pentahydrate of sodium metasilicate has come on the market as a white, free-flowing, quickly soluble product.

With this knowledge, mill chemists, confronted with a problem of conserving as much chlorine as possible, set to work. Since the Carter paper had shown best results on sulphite, with lesser effects on soda and sulphate, the first trials were made on sulphite stock. Laboratory tests were only fairly successful but recognizing the difficulty of maintaining conditions in a beaker comparable to those encountered in the bleacher itself, the preliminary work was not considered too discouraging, and trials were accordingly conducted on plant equipment. It was very quickly seen that when sodium metasilicate was used to the extent of one half per cent on the weight of the air-dried pulp, it was possible to obtain the same degree of whiteness with 15 per cent less chlorine than they had previously required. Since a reduction of only 10 per cent chlorine was actually necessary, the results were considered very satisfactory. For some work it was found desirable to use as much as 1 per cent of metasilicate, and in a few cases considerably more than 15 per cent of chlorine was saved. In addition to meeting a critical shortage, the resulting reduction in operating cost was, of course, of much interest to the paper manufacturer.

The favorable results obtained in this first test have been repeated many times in other parts of the country, with results equal to that shown in the accompanying illustration. The sheets shown were from identical sulphite pulps, handled in all respects exactly the same except that the brighter one contained 1 per cent of "B-W" silicate.

The process is fundamentally simple. Silicate in proper amount is added to the pulp a little at a time so as to obtain as even distribution as possible. If the bleacher is filled by a screw conveyor, the silicate may be added at that point. If the pulp is in the form of laps, the silicate may be added to the water in which the pulp is being dispersed. The usual control of temperature is necessary and care must be taken to keep it at a point where the chlorine is not discharged so rapidly that it is wasted. Such a matter is, of course, obvious to the operator.

There are indications that further restrictions on chlorine may completely eliminate the bleaching of sulphite pulp. In such a case, interest in the silicate process will be held in abeyance until chlorine can be returned to its peacetime purposes. When that occurs, every bleacher of pulp will want to consider the effectiveness of the silicate-hypochlorite combination.

In the meantime, the bleaching of sulphate and soda pulps probably will continue. For these pulps multiple-stage bleaching is in common use. Here the problems are somewhat different. In the stages involving hypochlorite, the addition of silicate is entirely practicable. In those cases where direct chlorination is involved further study is needed. It is possible that the acid character of the solution may cause difficulty. However, if the silicate is added in very dilute form, precipitation of the silica should be avoided.

In all cases either the granular metasilicate or the highly alkaline liquid silicate may be used. The choice between the two is one of greater convenience of the metasilicate measured against the lower cost of the liquid. It should be kept in mind that there are occasions where amounts greater than 1 per cent of silicate may be effectively used. Some types of pulps seem to require increased amounts of silicate before showing improvement in brightness, and where production requirements warrant, amounts as great as 3 per cent may be considered.

There has been considerable conjecture as to the reason why these small amounts of silicate should be so effective in improving the whiteness of the pulps. It was first assumed that it was due to the additional alkali of the silicate but tests with other alkalies quickly indicated the falseness of that idea. Carter believed that the flocculent precipitate which forms when silicate is added to hypochlorite was an important factor, but precipitates formed by other calcium salts reacting with silicate of soda are not impressively helpful. There is some reason to think that reduction of the interfacial tension between pulp and bleach liquor by action of the silicate may have an important bearing on the reaction. Whatever the true answer may be, the fact that silicate does have a marked result is unquestioned.

One of the peculiar experiences of this work has been the difficulty of obtaining satisfactory results from laboratory tests. Time and again trials in the laboratory have indicated very little value in the addition of silicate, but when the process was tried on a commercial scale the effect was immediately apparent. The difficulty may lie in failure to properly limit

Sheets from identical sulphite pulps handled in all respects exactly the same, except that the brighter one (right) contained 1 per cent of "B-W" silicate.

contact of the pulp in the beaker with the air above it. Certainly a much larger proportion of pulp would be in direct contact with the atmosphere than it would under plant conditions. It is unusual for any chemist to argue against the results of laboratory tests but in this particular case there are apparently factors so difficult to control that the point must be emphasized.

The limitation on bleach consumption throws an added responsibility on the operator in charge of cooking and washing the rags, for the more completely he can remove dirt and color, the less need there will be for bleaching after the pulp is formed. In this operation the detergent action of silicates comes into play. The best combination for maximum color removal with minimum effect on fiber strength calls for metasilicate and caustic. If the rags are greasy or otherwise exceptionally dirty, a little rosin also should be included. In one test, excellent results were obtained by cooking 4,000 pounds of very dirty rags for 10 hours with a mixture of caustic soda, Metso, and rosin in 2,200 gallons of water. When cooking rags, sufficient alkali should always be used to leave a slight excess at the end of the operation.

Following the cook, the stock must be drained and washed free of alkali if it is to remain in bins, but if it goes directly to the washing beater, the cooking liquor need not be drained off as the presence of the metasilicate will be a distinct aid in washing. The operator may, in fact, want to add more metasilicate for this specific purpose. By running the beater a few minutes before lowering the screen, a large proportion of the remaining dirt will drop out and the action of the metasilicate will also prevent the dirt from being redeposited on the pulp.

Some mills follow the practice of washing their rags before cooking. The recommended procedure is to give the rags a short flush of very hot water if they carry a highly greasy soil, otherwise a milder temperature is suitable. This is followed with a bath of hot water containing metasilicate plus a little soap or rosin. After twenty minutes washing the solution should be dumped and the rags rinsed thoroughly. An advantage of the prewash process is that acid soil is neutralized and, therefore, the alkalinity in the cooker is maintained at its desired efficient level.

Deinking is another wartime problem confronting many a papermaker. Here again silicate of soda can be very useful. More than twenty-five years ago patents on the effect of silicate for this purpose were beginning to issue and since then there have been many processes for the removal of inks from printed surfaces involving the use of this versatile product.

Deinking is fundamentally a detergent problem. It requires an agent which by its wetting ability will lift the oily ink from the paper fiber and will float it loose. The pigments must be dispersed, the oil emulsified and the pulp protected from readsorbing the loosened soil. It is logical that silicate of soda, long so widely recognized as a cheap and remarkably effective detergent aid, should be found useful for this service.

Although the basic steps in deinking are simple, there are many factors which the operator must watch closely. The process involves beating the paper to a pulp and soaking in an alkaline solution, flushing away the loosened ink and reforming the sheet. Various proportions of silicate and wetting agent are used. In one case a combination of caustic and metasilicate plus a little pine oil was very satisfactory. Even better deinking has been obtained with a metasilicate and rosin mixture which is giving excellent results on many types of newsprint, rotogravure and magazine stock. The fact that silicate works well on a wide variety of paper and ink is a distinct advantage as it reduces considerably the need for extensive hand sorting, a costly, time-consuming operation.

Silicate of soda is by no means unknown to the papermaker. Its use in the beater, for instance, to increase the toughness, ink resistance, hardness, to lay the fuzz, and to improve the finish is old and well recognized. Pulp digesters are lined with silicate cement; clay for coating is thinned with silicate; it is used for capping rolls. The use of silicate in bleaching, rag cooking and deinking is not as well known, hence, operators may find the foregoing suggestive in adapting the processes to their particular needs.

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Tools for Gargantua

▶▶▶ Whether it is a one-half inch piston for a model airplane engine or a piston a yard across for a central station Diesel, a roller for a needle bearing or a roll six feet thick for a rock crusher, any part which demands precise dimensions for interchangeability or functioning must be processed on a machine tool. Accuracy, particularly, when combined with rapid metal removal, requires in the machine tool a rigidity and freedom from vibration which can ordinarily be achieved only by massive design; and when the ability to take work pieces of large dimensions must also be included, there result machine tools of quite gargantuan size, sometimes dwarfing a locomotive. . . .

War, of course, augments the usual demands on large machine tools and adds a few of its own. The barrel of a 14-inch, 45-calibre gun, for example, is 52.5 feet long. (*Industrial Bulletin* of Arthur D. Little, Inc.)

Materials Handling *with* Industrial Trucks

W. S. McCANN, Secretary
The Industrial Truck Statistical Association

▸▸▸ THE PAPER INDUSTRY, like most other American industries, is confronted with the greatest demand in its history, and the importance of getting maximum results from existing facilities and equipment is vital not only to its management but to the future of the country as a whole.

Because the requirements of this country's military forces and those of its allies are placing undreamed of pressure upon the facilities of all industries, the Government has deemed it necessary to undertake allocation of many essential materials and finished goods in order that critical war materials and supplies are given priorities. The need for this supervision is now generally recognized. Industries, like the paper industry, realize that though their products are extremely important to the war effort, they cannot hope to obtain machinery and equipment to expand plant capacity.

American industry must do everything possible to eliminate waste, and to maintain existing equipment in efficient working order to assure its long life. In the paper industry, probably no equipment is more dependable than electric industrial trucks. This statement can be made with confidence because records of the Industrial Truck Statistical Association indicate that the average age of all electric trucks and tractors in service at the end of 1941 was in excess of 13 years. Many of the trucks which were built for use in the first World War are still in operation and giving satisfactory, reliable service despite their antiquity.

The paper industry was one of the pioneers in the application of the Consolidated Load Principle to its materials handling problem, and it was the first industry to successfully tie that principle into its sales policy.

The Consolidated Load Principle is merely the application of the axiom that the more pieces or pounds of material it is possible to move in a single handling operation, the lower will be the cost per piece or per pound.

Under ideal conditions, 1,000 lb. would be the approximate maximum hand-trucking load, and 100 ft. per minute the maximum speed with which such a load could be moved. By loading materials on a trailer, skid platform, or pallet and using a power industrial truck, loads of 2, 3, and 5 tons (and even substantially heavier) may be moved at speeds three to five times as fast as by hand truck.

So far as can be determined, at the start of the industrial revolution most of the handling of materials and finished goods was done manually, piece by piece. As the size of plants increased, the hand truck was introduced and was the primary means for the movement of materials and goods until the development of mass production methods. These methods required the movement of materials in such volume and at such speed that manual handling was soon discovered to be inadequate, with the result that overhead cranes and hoists, conveyors, and finally, for greater flexibility of operation, electric industrial trucks were developed to solve the problem. The first industrial truck built was designed for the baggage handling service of the railroads. It was nothing more than a motorization of the platform baggage truck, with which everyone is familiar. However, because the time consumed in loading and unloading by hand substantially reduced the time in which such a truck could actually be moved to and from cars, it was not long before the tractor-trailer system was developed. This system released the motive power unit for service elsewhere while trailers were being loaded and unloaded. Presently, the low-lift platform truck was developed to lift materials loaded on skid platforms in manufacturing plants and move them from one point to another. With this system, usually a predetermined number of pieces make up a skid load. As the pieces are processed, they are reloaded onto another skid platform by the machine operator. The load as a unit is then moved by the low-lift industrial truck to the next operation. It was soon found that in order to conserve storage space it was desirable to tier the skid platforms on which materials were loaded. The high-lift platform truck was developed to perform this service.

While the skid platform, lift-truck system was originally designed for the intraplant movement of materials, the idea was soon applied to interplant shipments and, by the paper industry, to the shipment of finished product. However, the problem of the return of skid platforms, which involved a considerable investment, and the fact that some commodities when loaded on skid platforms could not be tiered without damage to the commodities, was a deterrent to its general application. To overcome both of these disadvantages, another type of platform known as a pallet, as well as a fork truck which handles the loaded pallets on forks suspended over the end of the truck, were devised. More recently, a hand-lift fork truck (Figure 1) has been perfected. This truck is used in places where volume is small, where tiering is not a factor, or in conjunction with power fork trucks.

A pallet is similar to the skid platform, except that the platform has only about half the minimum underclearance of a skid, being mounted on three 2 in. x 2 in. battens, one at each end and one at the center. For handling

"Adoption of pallet shipping rarely increases packing costs materially, and often reduces them. For crates and boxes, the addition of 2x2 battens is all that is necessary. In many cases, the load needs only be PAPER WRAPPED and steel-strapped or wired to the pallet, thus saving the cost of boxes and other containers. If fork-truck handling is assured at transfer points and at destination, the dropping, turning on sides, use of hooks and other abuse incidental to manual handling no longer has to be considered. . . .

"Under these circumstances, suppliers should be willing to pack so as to permit fork-truck handling and customers should welcome the receipt of products so packed. Each will be enabled to effect a saving, the one in the cost of shipping, the other in the cost of receiving. The railroads will be able to reduce their break-bulk costs whenever less than carload shipments are involved."—*"Material Handling Handbook."* (Published by the Industrial Truck Statistical Association.)

products which are to be tiered, pallets are usually constructed with a platform both below and above the battens.

While a majority of the paper manufacturers employ the skid platform, lift-truck system in their shipment of flat stock product, some of the more recently constructed plants have adopted the pallet, fork truck system. The advantages of the pallet, fork truck system as compared with the skid platform, lift-truck system are:

1) Pallets can be constructed less expensively and discarded after one usage; when goods are boxed or crated, no pallet is required, it then being necessary only to attach batten strips.

2) Because the underclearance is only about half the minimum for a skid platform, pallets require less space in carloading.

3) For commodities which are more easily damaged in tiering, the use of a double-faced pallet provides a load distribution unattainable if a skid platform is employed.

4) Because of the better load distribution, it is possible to tier to greater heights with resultant storage space economies.

With a power fork truck, pallets (Figure 2), skid platforms (Figure 3), paper rolls (Figure 4), barrelled or baled goods, and other unmounted loads may be handled.

The earlier methods of handling packaged paper on skids were the result of the development of hand-lift trucks. These trucks were customarily furnished with steel wheels, and usually were 6 or 8 in. high. The low truck height was attractive to the user because it reduced the cost per skid more or less in proportion to the height of the skid. When electric trucks were adopted, it was natural to retain this low underclearance in order to standardize the skid height of the packaged paper with maximum savings. A standard skid loading of 4,000 lb. was established and most lift trucks purchased by the paper industry are of that capacity. Recently a practice has been developing with some printers and fabricators of paper to call for 6,000 lb. skid loads. The low underclearance referred to above imposed design difficulties on the electric truck manufacturer that did not exist with hand-powered vehicles. First, with an electric truck, it is almost imperative to employ rubber or other non-metallic wheels in order to avoid damaged flooring. Second, it is necessary to have all of the wheels of the electric truck steer for easy handling in minimum aisle space. Third, because of the width of packaged goods and the space between the legs of the skid, the over-all width of the truck is limited. These combined limitations

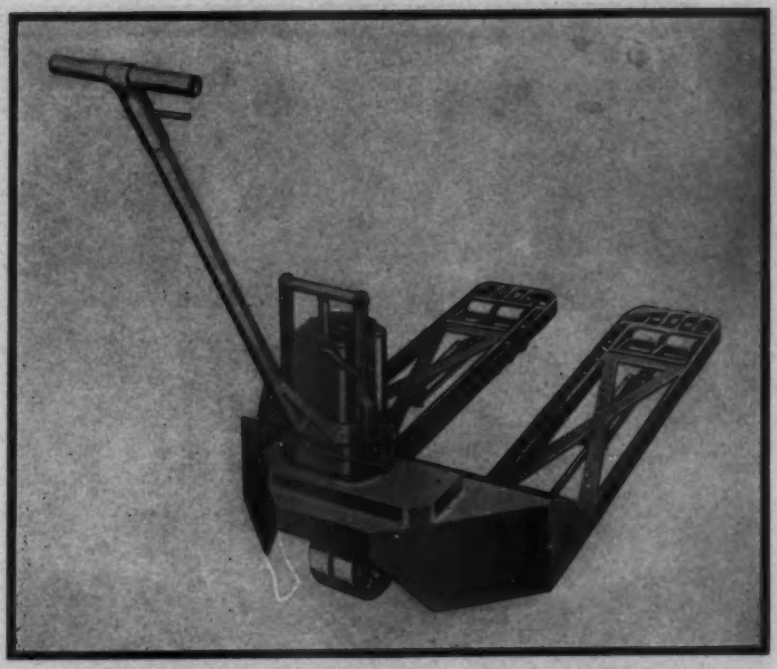

Fig. 1—Hand-lift fork-truck for use with specially designed pallets.

do not permit the use of sufficient rubber and structural material to carry overloads on present equipment without affecting the safety factor and shortening the life of tires.

Ordinarily, electric trucks of the elevating platform type are designed with a minimum platform height of 11 in. instead of 6 in. This greater height permits the use of larger diameter tires as well as heavier structural parts, bearings, knuckles, etc., which are more capable of withstanding overloads than trucks having only 6 in. diameter wheels such as are used on most of the paper industry's present equipment. The rubber companies recommend 6 in. tires as good for 1,000 lb. to 1,200 lb. capacity each, so that four tires are good for their share of a 4,000 lb. skid load and their share of the truck weight. However, when 6,000 lb. is carried (it being impossible to get larger diameter tires under the available underclearance) it is just too much to expect of the tires; bearings and knuckles also suffer.

Under the circumstances outlined above, two alternative recommendations may be made insofar as elevating platform trucks are concerned.

A) The paper industry should definitely limit its skid loadings to 4,000 lb. on all equipment with platform heights of 6 in. or 7 in. . . . OR

B) It should adopt a skid with an underclearance of 12 in. Then two 10 in. x 6 in. tires can be employed, and larger bearings, knuckles, etc., provided which would safely handle the load and reduce maintenance costs. It would be no trick for the printer or fabricator who specifies that 6,000 lb. loads be handled on hand trucks built for underclearance of 6 or 7 in. to place blocks of wood on a hand lift truck to handle the higher skid.

With manufacturing conditions as they exist today, the first recommendation should be followed so as to conserve critical materials. When more normal conditions prevail, consideration then may be given to the alternative recommendation, or the use of fork trucks.

In some paper mills where the volume of product to be handled now exceeds the capacity of existing trucks, it might be feasible to introduce the use of trailers in conjunction with the skid platforms or pallets. This can be done profitably where the distance between cutting machines and storage or between storage and inbound and outbound cars and trucks is sufficient. A skid or pallet load of paper can be placed on each of a string of trailers by a lift or fork truck which, when equipped with a coupling device, can be used as a tractor. Simultaneously, a skid or pallet load may be carried, and upon reaching the unloading point it might be uncoupled and used to unload the trailers. An interesting combination of the lift-truck, skid platform, and tractor-trailer systems is shown in Figure 5(a), 5(b), and 5(c). Of course, aisles must be wide enough for loaded trucks and trailers, with space here and there for passing. At loading and unloading points there

Fig. 2 (top)—Power fork-truck storing loaded pallet. Fig. 3 (center)—Fork-truck with loaded skid platform. Fig. 4 (bottom) —Fork-truck handling rolls of paper.

must be ample room for trucks to maneuver in loading and unloading the trailers.

Another point upon which a check should be made is whether or not trucks are equipped with sufficient battery capacity to provide ample power for maximum performance for the entire period of operation. Concerns producing war materials on a 24-hour, seven-day-a-week schedule have found that by adding spare batteries their existing truck equipment is ample for their needs.

Generally, the time needed to charge an industrial truck battery that has delivered its rated capacity during the shift is 6 to 8 hours. It has been found that the best and most economical service will be obtained when sufficient batteries are available to keep the average discharge cycles at not more than 300 per year. The guarantees applicable to most batteries contemplate that they will be called upon to deliver one discharge in the course of a 24-hour period, followed by one charge. Such a schedule on a six-day-a-week basis will result in approximately 300 discharge cycles a year.

Whether trucks will use spare batteries or not is a primary consideration in laying out a charging station, since it determines the maximum number of batteries for which space must be provided. When no trucks are operated more than 8 hours out of 24, usually the batteries remain in the trucks while being charged. Space then must be provided for each truck, with charging outlets along one or more walls. If the size and shape of the space available makes it necessary, trucks may be arranged in rows, with charging outlets on columns or suspended from the ceiling. If, however, the trucks use spare batteries, the charging room may be laid out to provide space for the batteries only. Charging benches of sufficient size to accommodate the batteries, arranged in one or more even rows, should be provided.

Usually the simplest and quickest method of changing batteries of any size (and for large batteries the most practical method) is the use of a hand or electric hoist, suspended from a monorail in either a fixed position or arranged to form a jib or traveling crane. All chain, hooks, and other parts of the hoisting equipment should be insulated to avoid a possible short circuiting of the battery. With this

equipment, a battery can be quickly removed from the compartment of a truck, set down on an empty bench and a charged battery then picked up and set in the compartment. Frequently less than one minute is sufficient to effect the battery change.

There is one other point in connection with obtaining maximum results from materials handling equipment which might be worth mentioning. It has been found by concerns which are today outstanding for their progressiveness in materials handling methods that it is extremely worth-while to center responsibility for the most effective utilization of their equipment in one person. In some cases, because of the work of such a man and the improved methods he has developed, plants now have a greater productive capacity than when first built.

The pallet-fork-truck system of shipping should be of interest to the paper industry not only from the standpoint of use in shipping flat stock paper and perhaps even rolls, but also as a possible medium for the expansion of the market for certain types of paper and paper products.

The fact that *Commodity Packaging Data*, issued by the United States Tariff Commission, lists some 3,000 packages, less than 1 per cent of which are on pallets, indicates that there are tremendous possibilities for reducing distributive costs through the modernization of packing methods. Substantial economies can be effected through the general adoption of the pallet-fork-truck system of shipping.

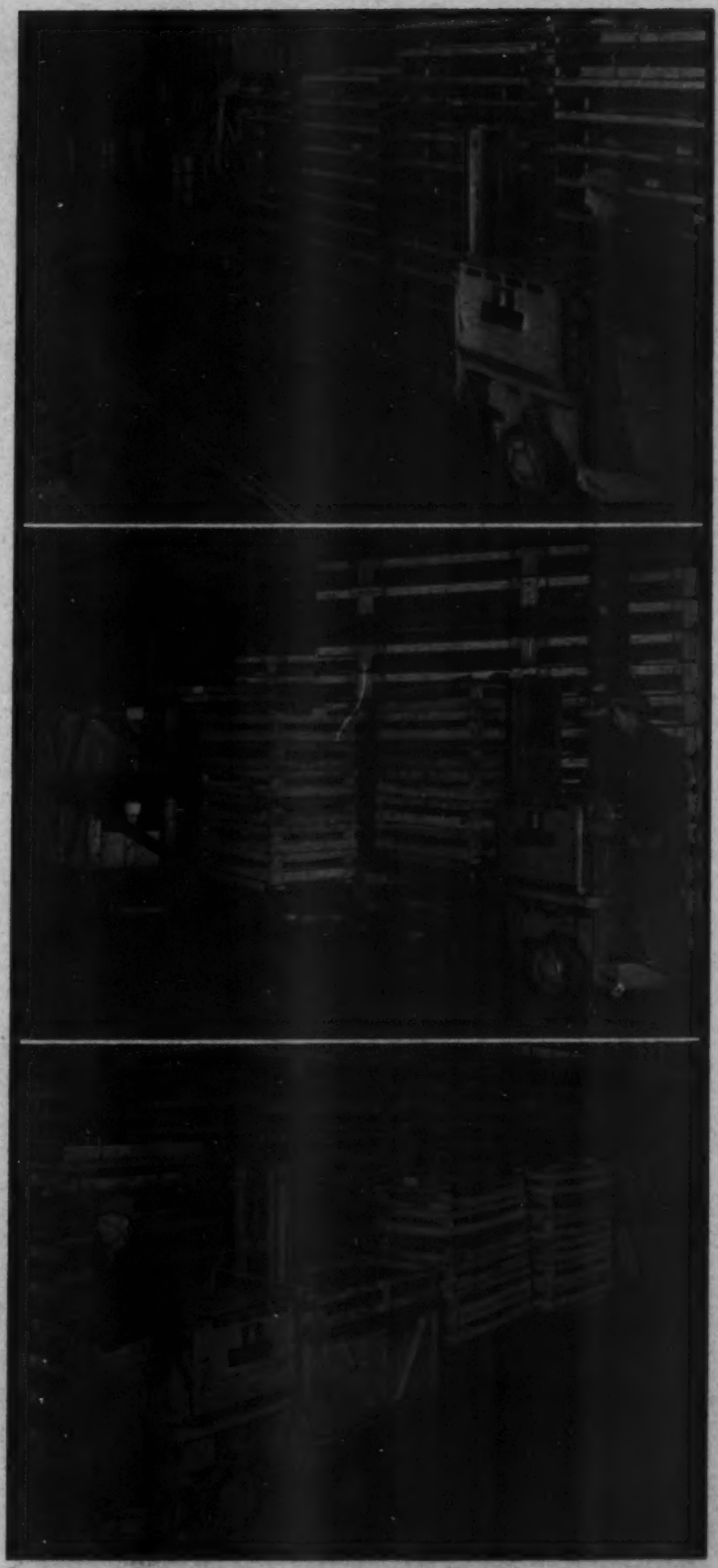

Fig. 5—Lift-truck, skid, and trailer combination. Trailers with swiveling platform (top) actuated by patented coupling device makes loading of skids easy (center). Trailer platforms loaded and in travel position, truck also carrying skid load (bottom).

To develop the greater use of paper and paper products which the widespread use of the pallet-fork-truck system would entail, the affected branches of the paper industry should study the application of their products in conjunction with the pallet-fork-truck system of shipping (*1-2*) to various types of products and do their part in educating other industries as to the advantages of applying the most modern version of the Consolidated Load Principle to their shipping, receiving, and selling practices.

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Operation and Maintenance of High-Pressure Boilers

FRED D. MOSHER

▶▶▶ AT THE TERMINATION OF the first World War, the paper industry like many other industries in the United States and Canada, was challenging equipment builders to produce bigger and better machines to manufacture the products that their laboratories had perfected. In step with the times of twenty-five years ago the paper industry also was seeking lower costs in the procurement of raw materials, cheaper processes, and improvements in the ultimate finished product; among the chief requirements was more and better steam at a lower cost. The word "better" is justified since the steam of today is of better quality than it was a quarter of a century ago.

In 1920, most paper mill boiler plants were operated at a maximum of 175 pounds pressure, and steam was used in its saturated condition for given pressures. There were operators who were convinced that paper mill steam need not be superheated and that higher pressures were not necessary; to those in the industry who were on the trail of lower costs the possibilities of higher pressures and temperatures loomed very large in the picture. In newsprint production, for example, from 20 to 30 per cent of the conversion cost of the product is used for the generation of steam and power. The obvious advantages of high pressure steam in papermaking resulted in the industry being among the first to use modern steam generators in its mills.

The steam generator of today is a piece of high grade equipment designed to fit the needs of all industries. Fuel burning equipment has been developed to burn every known industrial fuel. Industrial plants are now using pressures up to 2,500 pounds and steam temperatures of 950 Fahr. To make such pressures and temperatures possible manufacturers are using special alloys and high tensile steels, and the construction is all-welded. An integral part of the up-to-date boiler is the water-cooled furnace. Superheaters are common to most boilers, and economizers and air preheaters are often included to extract the utmost in efficiency. The paper industry uses a wide range of fuels from hog fuel to gas and mill boilers have been designed and equipped to burn them all with successful results.

Various surveys have indicated that coal continues to be the chief steam producing fuel in paper mills, and for coal burning there is a wide variety of equipment. In the last two and one-half years, 70 per cent of paper-mill installations have been equipped to burn coal of one kind or another; the other 30 per cent installed in this period includes all the other fuels common to paper mills.

The direct system of pulverized coal-burning in steam boiler furnaces is an outgrowth of the older bin system of firing powdered fuel. The bin system required that fuel preparing equipment be separate and distinct from the fuel burning apparatus. In the direct system, the coal pulverizing mills are connected to the boiler through pipes and are automatically controlled to supply fuel as needed to meet boiler demands. The direct system permits extreme flexibility in the operation of boilers, because the powdered fuel burns like gas which permits good control of fires and makes the lighting of fires a simple operation. Any coal used for steam generating purposes can be powdered and burned with success in a furnace designed for the purpose. In pulverized coal installations changes of grades of coal can be made without changing operating conditions. The uses of various grades of fuel in high-pressure steam generators is becoming common practice in paper mills. Multiple fuel burning is often done in paper mill boilers. Many pulverized fuel burning boilers are adapted for oil burning in the

Fig. 1 (left)—Worn parts of automatic stoker screw built up by electric welding. (Photo courtesy The Lincoln Electric Co.) Fig. 2 (right)—Three high-pressure boilers in Southern paper mill. The main fuel used is gas, but the boilers are equipped to burn bark and wood refuse. The capacity of each boiler is 75,000 lb. per hour operating at 600 lb. pressure and 750 Fahr. steam temperature. (Photo courtesy Foster Wheeler Corp.)

Fig. 3 (left)—Two 100,000 lb. per hour oil-fired boilers in a Pennsylvania paper mill. The boilers operate at 810 lb. pressure and are automatically controlled. (Photo courtesy Bailey Meter Co.) Fig. 4 (center)—Pulverized fuel preparing and handling equipment used in connection with three high-pressure boilers in a Newfoundland paper mill. Boilers operate at 82 per cent efficiency, generating 90,000 lb. of steam per hour each at a pressure of 430 lb. and steam temperature 670 Fahr. The boilers were installed after a survey showed that power could be produced more economically than could be realized by extending the hydro facilities. (Photo courtesy Foster Wheeler Corp.) Fig. 5 (right)—Half wood-burning furnace used in connection with gas-fired boilers shown in Fig. 2. (Photo courtesy Foster Wheeler Corp.)

same furnace without change of any kind being necessary when fuels are switched; a third fuel, gas, is sometimes added when the location of the plant makes it desirable to do so. During the past few years a number of gas-burning installations have been made in paper mills of the South and Southwest.

The introduction of high-pressure steam for paper mill operations has also shown engineers that in cases where major power requirements are filled by hydroelectric generation, the addition of steam units to meet increased demands is often economically justified. Such was the case when a large mill in Newfoundland was faced with the necessity of expanding its power generating equipment. Low-pressure steam was being used for process purposes. It was necessary, however, to increase the paper-making capacity by adding a new machine for which sufficient hydroelectric power was not available. Studies showed that if high-pressure steam generating equipment were installed using low grade bituminous coal as fuel, process steam could be obtained at low cost and by-product power could be generated in steam turbines at a cost that would meet that of hydro power. Three direct-fired pulverized coal-burning steam generators were installed having a capacity of 126,000 pounds per hour each operated at 450 pounds pressure. Performance of the plants has indicated that the high pressure boilers were justified in spite of the fact that the equipment had to compete with the hydro plant at the mill.

The principal stokers used in paper mill plants are the overfeed and the underfeed types. Stoker installations in paper mill boilers during recent years have been of the underfeed type in the majority of cases, although the traveling grate stoker is still widely used in mill boiler plants. Both underfeed and traveling grate stokers are adaptable for low grade coals with the underfeed being especially suited to eastern coals. Stokers are also used in multiple fuel burning; hog fuel and bark are often burned on stokers with coal. On the Pacific coast step-grate stokers, installed in Dutch ovens, are used to burn wood refuse. High temperature air is used with the step-grate stoker making the furnace proper a secondary burning unit.

There is not a modern paper mill in existence that uses hand-fired boilers for steam generation. Apart from the fact that it would be physically impossible to handle the required amounts of fuel by hand, the mechanical firing equipment used in modern units produces economies that could never be effected with the use of hand-fired boilers. The accompanying table shows a comparison of losses in a good hand-fired plant and those of an "average" stoker-fired plant.

Hand-fired and Stoker-fired Boiler Plant Losses

	Hand-fired (per cent)	Stoker-fired (per cent)
CO	1.50	None
Dry Gas	16.70	9.00
Combustible	4.75	2.00
Radiation	5.00	.60
Moisture	4.00	4.00
Total—	31.95	15.60

Papermaking is a large-scale, mass production industry requiring continuous supplies of steam; the industry is ideal for the application of the high duty, modern steam generator. Stoker-fired boilers show efficiencies up to 85 per cent and higher. Pulverized fuel, oil, and gas burning units give the highest efficiencies with efficiencies of 90 per cent being obtained. Progress continues in the art of burning fuel in steam generators and there are no indications that the end is being approached. The future will see further improvements in combustion and fuel burning, but there is little likelihood that any strictly new fuels will be produced; results should be expected

along the line of new methods of handling old fuels.

As much as 50 per cent of mill steam requirements may be furnished by the operation of recovery or waste heat boilers in sulphate and soda process mills. The black liquor of the alkaline process mills is used extensively in the kraft paper industry as a fuel for high-pressure boilers. Modern recovery units are of the high-pressure type, and a 300 ton mill will provide the equivalent in heat units of about 180 tons of coal per day. Heat from steam of 150 to 200 pounds pressure is of most value in pulp mills and heat recovery units are designed to provide steam of 600 pounds initial pressure and higher while extraction or high back-pressure steam is used for process work. Each mill has its individual problems, and the recovery plant must be designed around the economic needs of the mill.

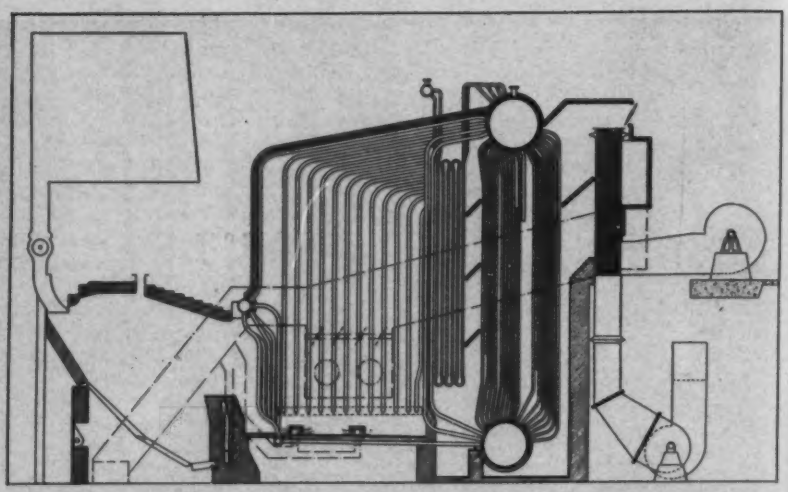


Fig. 6—Sectional view through high-pressure gas-fired boiler in Southern paper mill (same mill shown Figs. 2 and 5) showing location of wood-burning furnace with respect to main boiler. (Illustration courtesy Foster Wheeler Corp.)

High-Pressure Boiler Operation

Regardless of how well a high-pressure steam plant is designed and installed, many of its advantages may be lost through improper operation of the equipment. The objective to which steam plant operation is directed is the furnishing of a continuous flow of steam as economically as possible for the given plant. Factors contributing to the attainment of the objective are availability of the equipment, high load factor, and low maintenance costs. Each piece of equipment must be kept at high availability and must be made to carry its share of the plant load. Each pound of fuel must be converted into energy in the form of steam at the highest efficiency possible; it is to the efficient burning of fuel that steam plant operators must devote their best efforts. Since fuel is the largest item of cost in the production of steam, its proper burning is of prime importance. Boilers give the best results when equipped with automatic combustion controls. Boiler controls are designed to regulate the supply of fuel and air to the furnace so that changes in load are met in such a way that proper pressures are maintained at all times.

The handling of air supply to a furnace is often the key to good efficiency. Too little air has many adverse results. Inadequate air supply will result in the formation of CO in the gases of combustion with consequent loss of heat units, and with the formation of CO the amount of combustible material going to the ashpit is increased. The formation of CO in the stack gases is often accompanied by higher than normal furnace temperatures which may increase furnace and boiler maintenance resulting in higher ultimate costs for steam. As the amount of air supplied to a furnace is reduced there may be a proportionate rise in the CO_2 content of the stack gases which may lead operators to assume that the condition is an indication of high efficiency. This is not necessarily true.

The factors already cited must also be considered in order to evaluate the results of high CO_2. In fact, CO_2 content alone is not sufficient in any case as an indication of boiler efficiency or lack of it. It is difficult to predict accurately in advance the exact amount of excess air at which a given steam generator will show the highest efficiency. But it is definitely feasible to fix the conditions with a unit in operation; it should not be assumed, however, that boiler performance is something that can be fixed for prolonged periods. For example, load conditions may change with seasons and production schedules; fuels may have to be changed from time to time for one reason or another; operating schedules may not always permit planned cleaning and maintenance. Successful boiler operation requires vigilance of the type that results in the revelation of waste and the correction of adverse conditions as they arise.

Which is to be avoided most in boiler operation, too little or too much

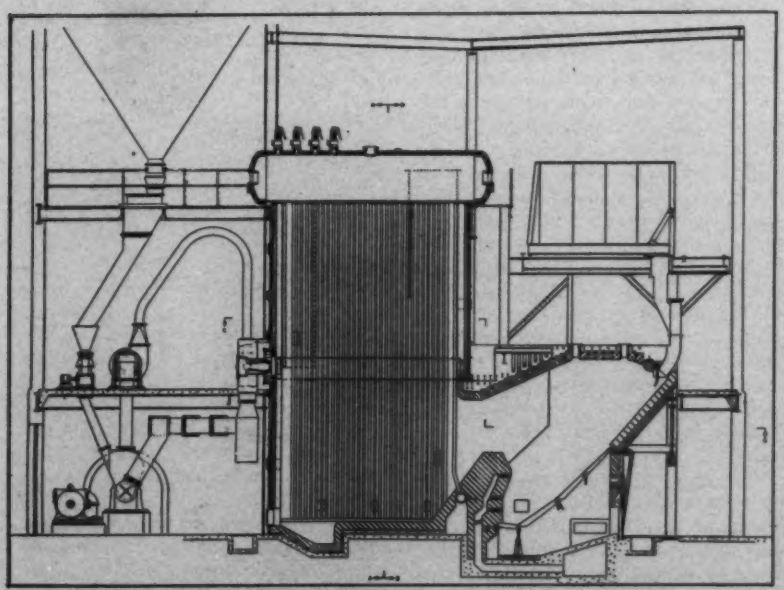


Fig. 7—Section through high-pressure boiler used for process steam generation in a Newfoundland paper mill. The boiler is fired with pulverized coal and is equipped on the opposite end with a wood-burning furnace for the utilization of bark and wood refuse. (Illustration courtesy Foster Wheeler Corp.)

air for combustion? There are, of course, obvious limits to both. The disadvantages of too little air which already have been discussed may be matched with a number of disadvantages in the use of too much air. In some localities there may be an irreducible minimum necessary to prevent the violation of smoke ordinances. Every pound of air over that required for desirable boiler performance is a vehicle for waste of heat by way of the stack, and increasing amounts of abnormal air supply will tend to raise the temperature of the stack gases and further aggravate the heat loss.

Corrosion and cleanliness are two factors that must be contended with in the operation of paper mill boilers. In soda mills, corrosion is not as destructive as it is in the sulphate mills. Organic acids in black liquor rapidly corrode unprotected surfaces; much of the difficulty from this quarter has been overcome by the use of alloy steels. In coal burning units, efficiency is lowered when slag and ash are permitted to accumulate on heating surfaces. Cleaning should not be considered an exclusive maintenance item to be handled during outages only. Cleaning by hand-lancing and through the use of properly located soot blowers will pay dividends if scheduled with other work incidental to operations.

The necessity for keeping the internal surfaces of boilers as clean as possible goes without saying. The conditioning is a science in itself and is properly the field of experts. The high duty of the modern steam generator makes it imperative that surfaces inside the boiler be kept free from scale and corrosive action. A dirty boiler, either inside or out, is an inefficient piece of apparatus, and to operate it in this condition is to ask for waste and eventual trouble.

High-Pressure Boiler Maintenance

Sound boiler maintenance has always been a necessary part of successful steam plant operations. Now, more than ever, it gets a prominent part on the must list. Two of the main purposes of boiler maintenance are to keep generating units at a high degree of availability for service and to maintain the equipment in such condition that specified or expected efficiencies can be obtained at all times.

The most effective maintenance is that which is planned and carried out on schedule and aimed at preventing forced shutdowns; this kind of maintenance is pointed at reducing inefficiencies and increasing availability of units. The maintenance of boiler settings is an example of such preventive and corrective procedure. Often, because of the nature of such structures, boiler settings permit the infiltration of large quantities of air; leakage of this kind increases the power required for fans and adds to the stack heat losses. Brick settings can be made tight by cementing cracks and open spaces and by applying an outer coating of protective paint. Steel casings can be tightened with cement and seal welding. The settings of large steam generators may allow enough air leakage to offset all the good performance from an otherwise well-operated unit. Maintenance of boilers is not something that can be postponed. Once a condition begins to develop it may proceed rapidly to a point where a forced outage results. Today, more than ever, maintenance must be of the preventive kind to avoid the necessity for replacements.

Considering again the item of cleaning: Thorough cleaning must be done before a complete inspection can be made. The hard-to-get-at sections of a boiler may be the most important on the cleaning list. Banks of boiler tubes must be free of soot to do the job intended for them. Soot is highly insulating and its presence on heating surfaces reduces the heat-absorbing capacity of such surfaces. The practice of washing economizers and air preheaters to remove deposits on external surfaces is recommended where this method is practicable. The sulphur in most coals will cause corrosion through soot deposits particularly if moisture is present. Steam or water leaks from any source in or around boilers should be traced and corrected. Compressed air, vacuum cleaning or dry steam are recommended for removing soot from inaccessible surfaces.

To get the best results from planned maintenance the records of inspections and required repairs should be kept. The responsibility for inspection and repairs should be vested in one person so that instructions and approval may come from a single source.

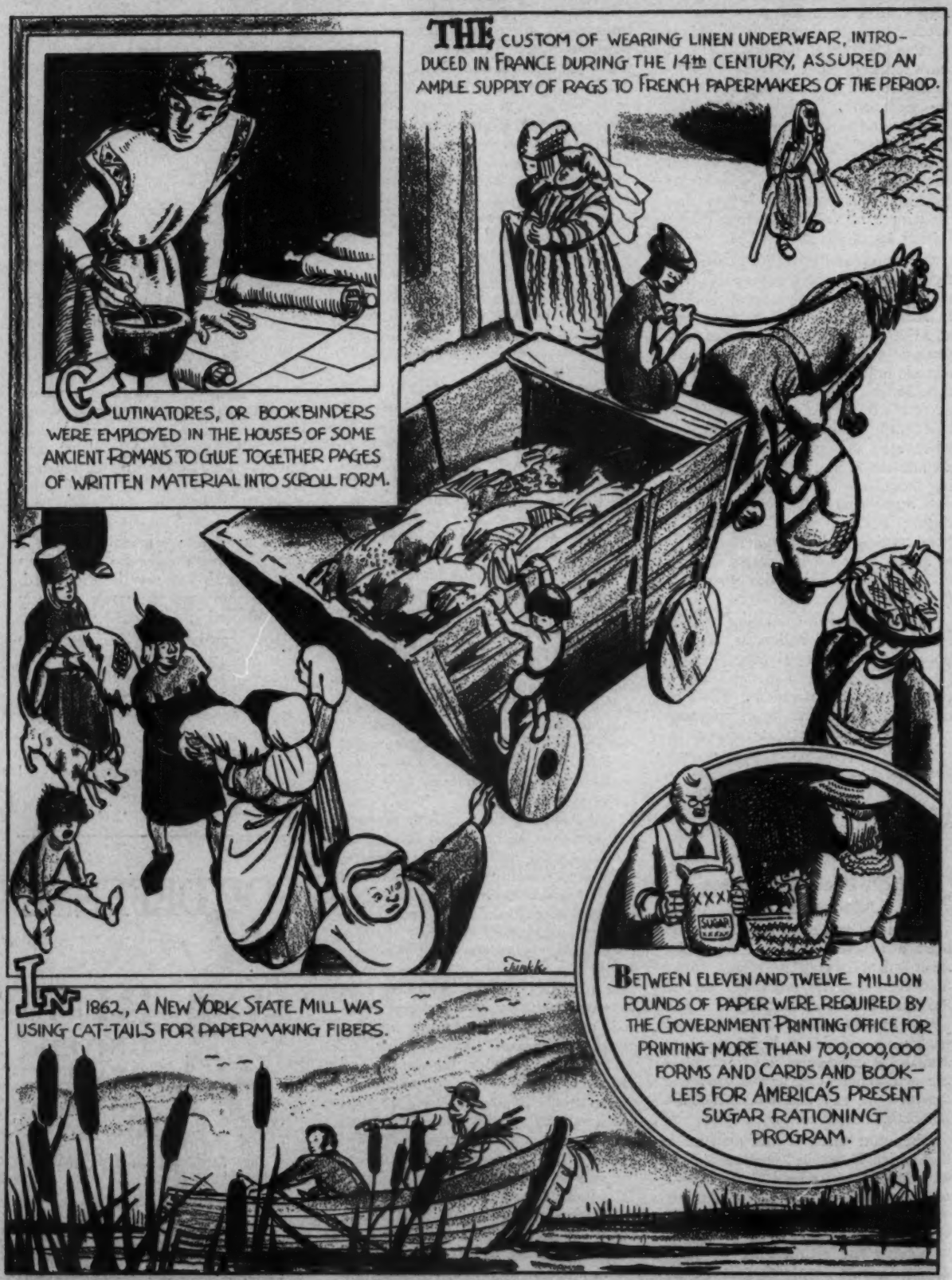
Nothing in recent years has done more to simplify maintenance work and to reduce the costs of upkeep than has welding. The two common methods used are the arc welding and gas welding processes. Both processes are extensively used for the repair and maintenance of high pressure steam generating equipment. Welding must be handled by highly skilled operators and is not a job for amateurs. Welded repairs for pressure parts of boilers should have the prior approval of state and insurance authorities or authorized inspectors of municipalities if within such jurisdiction.

The tubes of high-pressure boilers should be hand-rolled if leakage is found; if leakage persists after rolling, the ends may be seal-welded for tightness. Cast iron parts of fuel burning equipment may be welded if the process is fully understood by the operator. Welding is used to build up worn parts of shafts and corroded areas.

One of the most persistent problems in boiler plant maintenance is that of induced draft fans. A fan has not yet been designed that will stand the rigorous service of modern boiler operation without constant maintenance. Efficient operation of the boiler has much to do with the life of induced draft fans. Incomplete combustion of some coals results in excessive abrasion of blading and housings of fans. Fans and housings must be cleaned regularly since dirt, particularly on rotors, may result in unbalance, overheating, and possible serious damage. Liners may be installed to take up erosion and prevent wear on housings. Worn blades should be renewed in order to keep power consumption down and efficiency up. Rotors may be repaired by welding if constructed of mild steel. If the fan is built from alloy steel, the builder should be consulted before attempts are made to weld the material. With care the life of an induced draft fan may be prolonged, but the job must be taken seriously and followed up religiously.

High-pressure steam generators are in a class with other types of high grade equipment in that they function best when treated properly. The high-pressure boiler to perform as intended must be operated in such a way that its efficiency and availability are always at the maximum permitted by load conditions.

PAPER SKETCHES


THE CUSTOM OF WEARING LINEN UNDERWEAR, INTRODUCED IN FRANCE DURING THE 14th CENTURY, ASSURED AN AMPLE SUPPLY OF RAGS TO FRENCH PAPERMAKERS OF THE PERIOD.
GLUTINATORES, OR BOOKBINDERS WERE EMPLOYED IN THE HOUSES OF SOME ANCIENT ROMANS TO GLUE TOGETHER PAGES OF WRITTEN MATERIAL INTO SCROLL FORM.
XXX
BETWEEN ELEVEN AND TWELVE MILLION POUNDS OF PAPER WERE REQUIRED BY THE GOVERNMENT PRINTING OFFICE FOR PRINTING MORE THAN 700,000,000 FORMS AND CARDS AND BOOKLETS FOR AMERICA'S PRESENT SUGAR RATIONING PROGRAM.
IN 1862, A NEW YORK STATE MILL WAS USING CAT-TAILS FOR PAPERMAKING FIBERS.

...les of Pulp are tiered to the ceiling by Baker Fork Trucks.

Baker Low-Lift Truck carries skids of paper sheets at a large printing house.

Three-high tiering of rolls is simple, routine work for this Baker Fork Truck.

BAKER TRUCKS save time and money handling PAPER

...ker Hy-Lift Trucks save time loading heavy rolls of paper.

● From pulp mill to print shop, the use of BAKER Electric Battery Trucks has proven itself as the efficient time-and-money-saving method of handling paper.

Pulp mills handle 400 lb. bales 16 at a time with Baker Hy-Lift Trucks, easily tiering them for space-saving in the warehouse . . . One large mill keeps more than 20 Baker Trucks in active daily service for its many handling problems . . . Loading and unloading cars and trucks is a major handling problem which Baker Trucks solve at many mills . . . The Baker Revolving Roll Handler does double duty where rolls are stored horizontally or vertically . . . One paper house reports that Baker Trucks cut handling costs 80% . . . a publisher paid for his Baker Truck in 18 months by savings in warehouse rent.

Are you sure your handling operations are at top efficiency? Let the Baker engineer review your problem and suggest needed equipment. Contact him or write us direct.

BAKER INDUSTRIAL TRUCK DIVISION
of the Baker Raulang Company
2169 WEST 25th STREET • • • CLEVELAND, OHIO

Packaged sheets of paper on skids are tiered by Baker Hy-Lift Trucks.

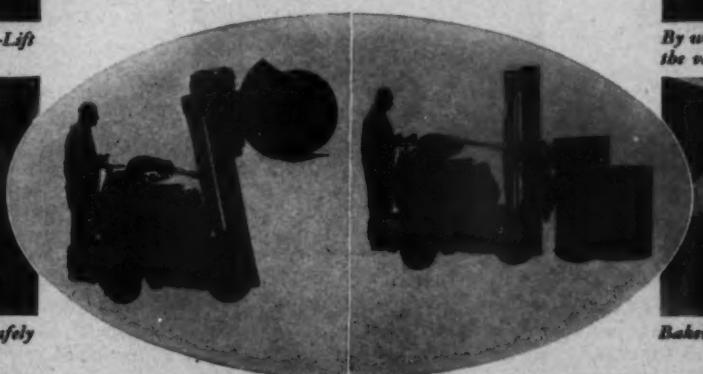
...here many rolls are carried long distances, Baker Platform Trucks turn the trick.

Inside box cars, Baker Low-Lift Trucks simplify loading and unloading.

...ading bales of pulp with Baker Low-Lift Trucks in record time.

By warehouse tiering, Baker Trucks doubled the value of floor space for a book publisher.

...ker Roll Handler tiers heavy rolls safely and without damage to load.



Baker Revolving Roll Handler rotates rolls for efficient handling and storing.

Baker Hy-Lift Trucks easily tier 16 bales of pulp at one time.

Trade mark Registered U. S. Pat. Off.

Baker INDUSTRIAL TRUCKS

in Canada: Railway and Power Engineering Corporation, Ltd.

ALLIED

AWARD NAVY "E" TO SANDY HILL

The Sandy Hill Iron and Brass Works, Inc., of Hudson Falls, New York, manufacturers of pulp and papermaking machinery, and one of the oldest concerns of its kind in that part of New York, was notified in a letter from Secretary of the Navy Frank Knox that the Navy Board of Production Awards had designated the company to receive the Navy's "E" Award for production achievement.

The Sandy Hill Iron and Brass Works, Inc., has been engaged for some time on Navy contracts, and the presentation of the award was made with elaborate ceremonies on May 8 with Navy officials in attendance. In acknowledging the honor, Frank A. Juckett, president of the firm, gave recognition to the fact that the reward is meant for the loyal employees, "without whom such progress would have been impossible."

◆

TITANIUM PIGMENT HAS 2 NEW OFFICES ON PACIFIC COAST

Titanium Pigment Corporation, New York City, announces the opening of its own offices in San Francisco and Los Angeles. These offices are now located at 350 Townsend Street, San Francisco, and 2472 Enterprise Street, Los Angeles, with R. Lee Wharton in charge of the San Francisco office and E. G. Burling in charge of the office in Los Angeles.

Effective after May 1, all orders, telephone communications, and correspondence in reference to Titanox pigments formerly directed to National Lead Company-Pacific Coast Branch, will be received at these new offices. After the above date, all invoices will be issued from and payable to Titanium Pigment Corporation, 111 Broadway, New York City.

◆

OUTSIDE SPEAKERS PARTICIPATE IN NOPCO LECTURES

The National Oil Products Company, Harrison, New Jersey, announces that the spring semester of the NOPCO Industrial School has just been concluded. During this semester, which embodied a series of six lectures on metal working and metal lubrication, a new policy was introduced by Dr. Edwin A. Robinson, director of technical research for the company's industrial division, who serves as dean of the Industrial School.

Dr. Robinson invited two prominent outside speakers—Benjamin McGar, Chase Copper and Brass Company; and Samuel Tour, Lucius Pitkin, Inc., to conduct classes.

The school has been conducted for the past two years for laboratory chemists and other employees of the company. Problems relating to the industries served by the company are discussed in order that employees may have knowledge of the latest developments in these fields. Papermaking has been included in these courses.

◆

ELEC. TESTING LABS., INC., TAKE OVER OLD COMPANY

The plant and equipment of Electrical Testing Laboratories have been acquired through purchase by a new corporation, Electrical Testing Laboratories, Inc., organized by a group of former employees of Electrical Testing Laboratories and headed by Preston S. Millar, president, according to an announcement made by Mr. Millar today. Electrical Testing Laboratories was dissolved recently and is now in the process of liquidation.

Preston S. Millar

The new corporation takes over the eight story and basement plant at 79th Street and East End Avenue, New York City, and the dissolved company's equipment there and elsewhere. It will engage in the business of electrical and general testing, inspection, research and certification in a wide variety of fields throughout the country, with representatives located in principal cities.

The new corporation will certify conformity of products and devices with requirements of specifications, as those of the Federal and State Governments, technical bodies and groups of manufacturers.

◆

MATHIESON TO BUILD SYNTHETIC AMMONIA PLANT

A plant for the synthetic production of ammonia, through the use of a modification of existing methods, by combining hydrogen with nitrogen obtained from the air, will be erected immediately, according to an announcement by the Mathieson Alkali Works, Inc., New York City.

In accordance with the terms of a contract that has just been signed, the new plant will be financed by the Defense Plant Corporation and will be erected and operated under lease by the Mathieson organization. The production of this plant will substantially increase the supply of ammonia and its derivatives.

◆

▶▶▶ CLEVELAND CRANE & Engineering Company, Wickliffe, Ohio, has just distributed Volume I, No. 1, of *Cleveland Crane Graphic*. This publication contains descriptions and illustrations of important installations in a number of industrial plants.

◆

G-E OFFERS PATENTS FOR WARTIME PROD.

At the annual meeting of stockholders on April 21, Charles E. Wilson, president of General Electric Company, Schenectady, New York, "repeated for the record" the company's offer to make available any of its designs and techniques that may be required for the Army or the Navy, for manufacturing by others, for the duration of the War, whether patented or unpatented. Mr. Wilson poined out that even before the attack on Pearl Harbor, and thereafter, the company had freely given patents, designs, and experience to others, many of whom were ordinarily competitors.

President Wilson reiterated that the General Electric Company has no intention of profiteering on war business. He stated that in a number of outstanding items, production is considerably ahead of schedule requirements.

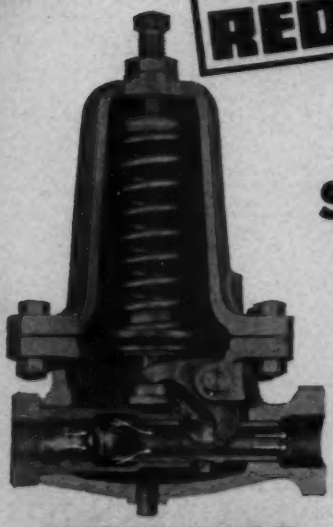
Eliminating

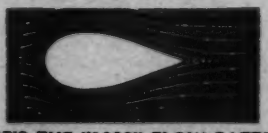
LOST PRODUCTION HOURS DUE TO "TIME OUT" FOR VALVE TROUBLES . . .

CASH STANDARD *Streamlined* TYPE 1000 PRESSURE **REDUCING VALVE**

Contributes toward

SPEEDIER PRODUCTION





HERE'S THE "1000" FLOW PATTERN The Streamlined form of the inner valve eliminates turbulence. It produces the flow pattern shown above which makes for maximum capacity when it is needed most and permits accurate pressure control under toughest working conditions.

You can find out full details on all of the Type 1000 benefits by reading Bulletin "1000" —send for it!

Today, with speed in output the keynote of American industry, trouble-free, smooth performance of equipment is essential to maintain schedules. Keeping idle hours down to the very minimum is a vital need in any type of production.

Because of these very things, the CASH STANDARD Streamlined Type 1000 Reducing Valve has a place of importance in industry's fast-operating set-up . . . it is an immediate answer to the practical elimination of "time-out" periods.

When this valve was first designed, 'round-the-clock service — month in and month out was the objective. How well the Streamlined Type 1000 fits into the pace-setting production picture now is seen by its no-trouble, maintenance-free operation for years past.

Among the benefits users get with it are: maximum capacity when needed most — accurate pressure control under toughest working conditions — elimination of failures — cost-saving operation.

A. W. CASH COMPANY
DECATUR, ILLINOIS

CASH STANDARD CONTROLS.. VALVES

A CASH STANDARD "GET ACQUAINTED" COLUMN

Question: **"Don't you people make anything besides that Streamlined Valve you talk about so much?"**

Answer: **"Yes Sir; we do! And we propose to picture one or two of them here each time."**

Cash Standard Type Q Relief Valve: maintains constant upstream pressure by relieving into lower downstream pressures, regardless of variations in downstream pressure. For steam, water, air, oil, many gases. (Similar valve for refrigeration fluids.)

Iron or bronze bodies; bronze trim; pressures up to 250 lbs.; top temperature 500° F. Screwed ends; sizes ¼" to 2".

Cash Standard Type 4190 Valve: holds constant back pressure on inlet side regardless of variation in outlet pressure or changes in load. A multiport, large capacity valve. Used on suction line in refrigeration practice. Also used extensively on bypass valve for oil pumps.

Iron or bronze bodies; iron trim. Screwed ends ½" to 2"; flanged ends 1¼" to 6".

Get Free Bulletins on Above . . . Write to A. W. CASH COMPANY DECATUR, ILL.

Helping to "Get it Done"

▶▶▶ WITH ALL INDUSTRY looking for ways to increase and speed production for the War, Harnischfeger Corporation, Milwaukee, has enlisted its employees in a "Beat the Schedule" Campaign. In the illustration, an employee production committee in the crane plant views the standing of its division in the campaign. Large, colorful billboards show the progress of work in all divisions of the company, the purpose of the program being to advance production as far ahead of scheduled completion dates as possible. Harnischfeger is now turning out the biggest volume in the company's history. This campaign gives "high gear" a new meaning.

Harnischfeger works to "Beat the Schedule."

▶▶▶ ORDINARY PAPER BAGS have some extraordinary uses these days. In a midwest General Electric plant they are used to keep dust off delicate instruments as long rows of these precious instruments move along an assembly line. Beneath each bag is a magneto which will go to war on an engine installed in a British or American fighting plane.

Paper bags are sentinels on assembly line.

▶▶▶ TWO M.G.M. STARLETS (Dorothy Schoemer, left, and Jetsy Parker) visit the Allis-Chalmers Manufacturing Company's plant in Milwaukee, on a nationwide tour to sell $3,500,000 in War Bonds and Stamps to purchase a destroyer. Ervin Zickuhy explains the machining operations on a propeller shaft which will find its way into a warship and he tells the girls "You raise the money, and we'll build 'em."

Stars see warship propeller shaft.

▶▶▶ THE INTERNATIONAL PRINTING INK national essay contest was open to students of printing in high schools throughout the United States and Canada. The subject was "Printing and American Defense," and 8,000 students competed. The second prize winner was 14-year-old Dixie Lonsdale of Santa Monica, California. She not only wrote the second prize-winning essay, but she made a decision which has proved her to be a real patriot. The award won by this girl was an airplane trip to New York City, all expenses paid. Instead of the trip, she asked that she be given the cost of the trip in War Bonds—bonds that will help to buy planes. Her mother works at the Douglas Aircraft plant, and that mother's daughter would "rather buy 'em than fly 'em." C. A. Whistler, Los Angeles manager of IPI presented a $250 War Bond to Dixie on May 1.

A trip to Manhattan or a War Bond?

▶▶▶ A HEAVY DEMAND for sulphur in 1941 reduced stocks at the mines somewhat; however, production has now been stepped up in spite of the present accelerated demand and shipments. Producers of sulphur, therefore, have available ample stocks from which consumers may build up reserves during the summer, thus relieving the strain on transportation companies during the fall and winter. The American sulphur industry finds itself well able to co-operate with industrial users of sulphur who recently were advised by the War Production Board to build up stocks of sulphur at their plants so that possible future transportation tie-ups would not halt their operations.

◆

RAVENNA PLANT ADDED TO U. S. STONEWARE CO.

The United States Stoneware Company, New York City, with plants at Tallmadge and Mineral City, Ohio, has announced the purchase of a 10-acre group of buildings at Ravenna, Ohio, by one of its units, The Chamberlain Engineering Ltd. The property consists of six buildings, with 50,000 sq. ft. of floor space.

All buildings are being extensively remodeled and much new plant equipment installed. The manufacture of TYGON heavy-duty tank linings, tubing, gaskets, and corrosion-resisting paints will shortly be transferred from the company's plant at Tallmadge. When these new Ravenna production facilities are in full operation, they will be ample for the handling and lining of full-sized tank cars and for any size of steel plate construction that can be transported on railroad flat cars.

◆

G-E OFFERS NEW SOUND-COLOR MOVIE ON ARC WELDING

A new six-part, all-color movie "The Inside of Arc Welding" has just been announced by the General Electric Company, Schenectady, New York. The first part of the movie is now available to public, private, and industrial welding schools, and other groups, while the other five parts will be ready early in June.

Each part is complete in itself and covers in full detail one particular phase of arc welding. Each is 400 ft. long, 10 minutes in duration, and can be used on sound-equipped 16 mm. projectors only. Throughout the six parts, the four principal factors of good welding — (1) current setting, (2) angle of electrode, (3) arc

length, and (4) speed of travel, with their effect on control of the molten pool, are clearly shown, explained, and emphasized.

These films may be obtained for single showings, or bought at print cost, by writing General Electric's Visual Instruction Section in Schenectady, or the nearest G-E office or welding distributor.

◆

▶▶▶ THE NAVY "E" AWARD was presented to the Automatic Transportation Company, Chicago, on May 2, with an impressive ceremony at the plant. The company is a division of the Yale and Towne Manufacturing Company, Philadelphia.

◆

100% RECLAIMED RUBBER USED FOR BLOWN SPONGE

The B. F. Goodrich Company, Akron, Ohio, has announced that 100 per cent reclaimed rubber is now being used in blown sponge rubber products, replacing the natural crude rubber formerly used.

Practically the same properties have been produced in the reclaim type sponge as were present in that made from crude rubber, particularly in the compression ability of the material, fundamental property of all sponge rubbers. It is being manufactured in the various molded or tubular shapes required for various uses, or in slabs which can be cut into the shape desired by the user.

◆

▶▶▶ ACQUISITION OF THE Hydro-Clone line of dust and fume suppression equipment for every type of foundry and industrial application has been announced by the Whiting Corporation, Harvey, Illinois. The Hydro-Clone units effectively suppress dusts and fumes by a simple process of disintegration in which dust and fume-laden air mixed with water is subjected to high velocity impact, and the air effectively cleaned without hazard of fire or explosion. E. F. Fisher, inventor of this equipment, is in charge of the department.

◆

▶▶▶ THE FIRST ISSUE of a news sheet called *War Production News* has just been published by The Labor-Management Committee for the War Production Drive at the B. F. Goodrich Company. This publication is issued for the purpose of assisting in the promotion and success of the War Production Drive. The illustrations are graphic and the items have a special appeal.

Bowie County, in the northeast corner of Texas supplies sawlogs, and pulpwood for papermaking. This unusual snow scene was taken by Frank Heywood, Jr., Forester for the Southern Pulpwood Conservation Association.

Texas now has four paper mills. The narrowest machine trims 57 inches, the widest 222 inches.

Wherever your mill, whatever your machine widths, they can be satisfactorily clothed with ***Draper Felts.***

Draper Felts Favor Efficiency at

DRAPER BROTHERS COMPANY

Woolen Manufacturers Since 1856 CANTON, MASS.

OUR REPRESENTATIVES to serve you
L. H. BREYFOGLE Kalamazoo, Mich.
W. L. CAMPBELL Savannah, Ga.
RALPH E. BRIGGS Canton, Mass.
C. K. BEECHER Delaware, Ohio
O. J. LELOFF Vancouver, Wash.

ASSOCIATIONS

PLANS PROGRESS FOR SUPTS. MEET AT GRAND RAPIDS

The committees in charge of the annual meeting of the American Pulp and Paper Mill Superintendents Association, which will be held at Grand Rapids, Michigan, June 16-18, have made use of a novel idea to help in the presentation of the theme of the Convention "Maintenance and Conservation in Pulp and Paper Mills." They have sent out two questionnaires in an effort to secure the latest and most vital information as to recent ways of meeting the present critical material situation, and to obtain ideas as to the problems the mills have to meet:

1) The Affiliates Committee has asked nearly 1,200 firms to state what they have done in their respective fields to develop substitutes and to keep mills in repair parts.

2) The Association has asked its membership of nearly 850 (a) to state the success they have had in carrying out the recommendations of the OPM Committee for the Conservation of Critical Defense Materials, (b) to state any other ways of saving critical materials which they may have tried, and (c) to list any maintenance problems not indicated in the report of the OPM Committee in which they anticipate trouble due to restrictions of critical materials. At this writing, a number of interesting replies have been received from both groups.

The first day of the Convention will be given over to an open forum on discussion of these questionnaires. It is expected some outstanding speakers will be in attendance to add some valuable suggestions to this part of the program. The second and third days will be given over to group discussions at which maintenance will be featured and some processing problems discussed.

◆

"LADIES NIGHT" WITH MICHIGAN DIVISION SUPTS.

More than 150 persons attended the annual Ladies Night dinner dance of the Michigan Division, American Pulp and Paper Mill Superintendents Association, in the Park American Hotel, Kalamazoo, Saturday evening, April 18. A reception of guests, many of whom came here from all sections of the Middle West, preceded a 7 o'clock dinner. The program concluded with dancing and a floor show.

L. L. "Buster" Griffiths, Kalamazoo salesman with the Williams-Gray Company of Chicago, was toastmaster. Assisting with division officers in arranging the reception and entertainment were: C. B. Smith, Huron Milling Company; Frank Eilers, Orr Felt and Blanket Company; Jacob Parent, Noble-Wood Machine Company, and Roy Holden, Stowe-Woodward Company, all of Kalamazoo.

◆

SE DIV. SUPTS. HOLDS ITS SPRING MEET AT RICHMOND

The spring meeting of the Southeastern Division of the American Pulp and Paper Mill Superintendents Association was held at Richmond, Virginia, April 18 and 19. Though the usual spirit of good fellowship was in evidence at all gatherings during the meeting, there was in every address and discussion a serious wartone. Chairman of the Division, Wm. H. Robertson, of the Champion Paper and Fibre Company, opened the meeting, and W. H. Brydges, a past president of the national Superintendents Association, presided at some of the sessions.

During the two days some very interesting and timely addresses were given. There was an illustrated talk on "Paper Machine Dryers," by C. W. St. Clair, of The Coe Manufacturing Company, Painesville, Ohio. A technicolor film on the manufacture of machine wires was shown by Smith McLandress, of the Appleton Wire Works. Representing the Virginia Manufacturers Association, Frank G. Louthan, secretary-treasurer, spoke to the Association on "Defense in Industrial Plants." This address laid the responsibility for building a strong inter-plant defense upon the individual management of each industrial plant. The speaker brought out strongly the responsibility that rests upon management to keep plants producing in the interest of winning the War.

At the Victory dinner and dance held the evening of the first day in the Jefferson Hotel, the guest speaker was Representative David E. Satterfield, Jr., from Virginia's Third District. This address was something of a War close-up, as Representative Satterfield gave an account of some of his experiences while on a recent trip to the British Isles as a naval air observer.

The address of John F. Darrow, of the American Paper and Pulp Association, dealt with many perplexing points connected with priorities and wood pulp allocation. Mr. Darrow's subject was "Pulp and Paper Industry Under Priorities." The priorities that affect the industry are constantly shifting and undergoing changes, and this is a subject that requires management to keep in close touch with association officials. (*See Section 2 of this issue for complete digest of priorities affecting the pulp and paper industry as compiled by the American Paper and Pulp Association.*)

◆

▶▶▶ PLANS FOR the 15th National Exposition of Power and Mechanical Engineering, better known as the National Power Show, are developing rapidly. The show is to be held at the Grand Central Palace, New York City, November 30 to December 5. To aid in increasing the production of war materials, displays will show ways and means of utilizing existing facilities to obtain more out of them, and will educate the thousands of new operating men on the latest methods and equipment for the generation, transmission, and utilization of power.

◆

OHIO SECTION TAPPI ELECTS OFFICERS

The annual meeting for the election of officers of the Ohio Section of the Technical Association of the Pulp and Paper Industry was held at the Manchester Hotel, Middletown, on April 23, 1942. The following officers were elected: chairman, Carl D. Roess, The Wrenn Paper Company, Middletown; vice chairman, Val Friedrich, The Beckett Paper Company, Hamilton; secretary-treasurer, Duncan S. Brown, The Gardner-Richardson Company, Middletown; and the executive committee consisting of Howard Harrison, The Crystal Tissue Company, Middletown; Harry Fisher, The Gardner-Richardson Company; O. P. Gephart, The Miamisburg Paper Company, Miamisburg; George H. Harvey, The Gardner-Richardson Company; and Ralph Roe, The Sorg Paper Company, Middletown.

Dr. Glenn C. Kimble, research assistant of The Gardner-Richardson Company, was the speaker of the eve-

Pile 'em HIGHE

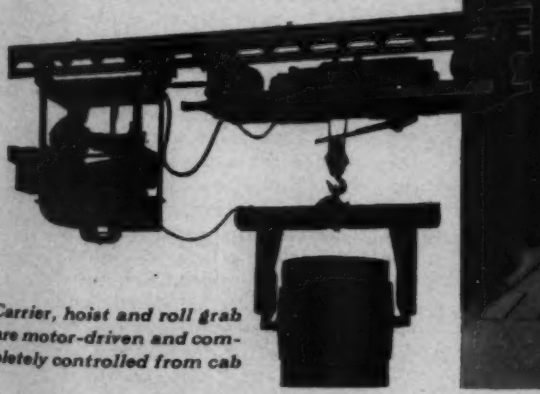
Handle 'em FASTER!

These days when mills are being hard pressed for paper due to war requirements many paper-mill executives are glad that their plants are equipped with Cleveland Tramrail.

With the supply of labor rapidly diminishing because of military requirements, Cleveland Tramrail is proving a big help. A crane operator with a motor-driven grab can pick up, transport and place rolls unassisted.

Storage space can be utilized more fully. Rolls can be piled on end to heights of 40 and 50 feet and higher. Aisle space may be eliminated. Several times as many rolls often can be stored in a given area.

Wherever installed Cleveland Tramrail is proving a great time-saving aid. In paper, as in other industries, it is an important factor in speeding production to help the men behind the guns.



Carrier, hoist and roll grab are motor-driven and completely controlled from cab

GET THIS BOOK!

BOOKLET No. 2008 Packed with valuable information. Profusely illustrated. Write for free copy on your company letterhead.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
4480 EAST 283rd ST. WICKLIFFE, OHIO.

MANUFACTURERS OF • CLEVELAND CRANES • CLEVELAND TRAMRAIL • STEELWELD BENDING PRESSES

CLEVELAND TRAMRAIL

OVERHEAD MATERIALS HANDLING EQUIPMENT

ning, and his subject was "Optional Studies of Pulping Operations." In his talk he discussed the determination and application of color measurements of kraft and sulphite cooking liquors for the purpose of studying the constituents of the liquors and for controlling the cooking operations.

◆

BRITISH ASS'N USES SHORTWAVE TO U. S. MILLS

On Sunday evening, April 12, Llewellyn Thomas, secretary of the Papermakers Association of Great Britain and Ireland, addressed the pulp and papermakers of America over the shortwave of the British Broadcasting Company in London.

Mr. Thomas said, "This is the Bridgebuilders calling the papermakers of America and sending personal greetings to R. G. Macdonald, secretary of the Technical Association of the Pulp and Paper Industry, known generally in Great Britain as "R. G.," who has done much to promote co-operation and good-will between the industry in America and Great Britain.

"In 1939, the British Association made extensive plans to send a large delegation of papermakers to visit Canada and the United States, and thereby promote better personal friendship. This trip was called off at the last minute because of the war, but the trip will be made when the war is over, and it is hoped that a large number of papermakers will make a pilgrimage to the British paper mills.

"Just as the first paper mills in America were built to provide paper for the advancement of education, so were the first mills built in England. Under war conditions, paper is made from straw, wastepaper, salvage, and other strange materials, but with these good paper is being made, considering the deficiencies of such raw materials.

"This broadcast is being made to forge a link of friendship between American and British papermakers. American papermakers, engineers, machine operators, beatermen, screenmen, cooks, bleachermen, superintendents, technical men are urged to write letters to similar men in Great Britain."

Such letters will be given to individual paper and pulp makers who will respond. Address your letter to "Bridgebuilders," c/o R. G. Macdonald, Technical Association of the Pulp and Paper Industry, 122 East 42nd Street, New York, N. Y.

(EDITOR'S NOTE: The above was the opening address of a regular radio program "Bridge Builders Calling Papermakers of America," which is broadcast each Sunday evening over shortwave from London through the facilities of the British Broadcasting Corporation. Listen and help build the Bridge of Friendship. Tune in on the 31-meter band at 9.58 megacycles. The program comes on at 8:25 p. m., Eastern War Time, 7:25 p. m., Central War Time.)

CONVENTIONS AND COMING EVENTS

May 15-16—Joint Meeting of Empire State Section of TAPPI and New York-Canadian Division of Superintendents Association, Hotel Syracuse, Syracuse, New York.

June 5-6—Joint Meeting of Pacific Coast Section of TAPPI and Pacific Coast Division of Superintendents Association, Portland Hotel, Portland, Oregon.

June 16-18—Twenty-third Annual Meeting of the American Pulp and Paper Mill Superintendents Association, Grand Rapids, Michigan.

June 23—A. S. T. M. Water Session, Hotel Haddon Hall, Atlantic City, New Jersey.

Sept. 23-25 — Twentieth Annual Conference of the National Industrial Advertisers Association at the Hotel Traymore, Atlantic City, New Jersey.

Sept. 29-Oct. 1—Fall meeting of the Technical Association of the Pulp and Paper Industry, Hotel Statler, Boston, Massachusetts.

Oct. 5-9—The Thirty-first National Safety Congress and Exposition at the Stevens Hotel, Chicago.

Nov. 17-22—National Chemical Exposition, at the Stevens Hotel, Chicago.

Nov. 30-Dec. 5—15th National Exposition of Power & Mechanical Engineering, Grand Central Palace, New York City.

STATED MEETINGS

Technical Association of the Pulp and Paper Industry.

Delaware Valley Section—First Friday of each month—Engineers' Club, Philadelphia.

Kalamazoo Valley Section — First Thursday of each month—Park American Hotel, Kalamazoo, Mich.

Lake States Section—Second Tuesday of each month—Conway Hotel, Appleton, Wis.

New England Section—Third Friday of each month — Roger Smith Hotel, Holyoke, Mass.

FORMULATE PLANS FOR TAPPI FALL MEETING IN BOSTON

The 27th fall meeting of the Technical Association of the Pulp and Paper Industry will be held in Boston from September 30 to October 1, 1942, with headquarters at the Hotel Statler.

Committee chairmen have been named and committees formed, and consistent, thorough work by them will insure an attractive and well-ordered meeting. All effort will be made to develop the timely opportunity afforded by this annual fall meeting toward definition, discussion, and solution of the problems confronting the industry as a part of our country's Victory effort. Serious co-operative planning for most efficient service will be paramount, and the educational program, conference opportunities, and recreation activities will be planned to be productive of the best development of this theme.

By next September there will probably be more problems regarding the conservation of critical materials, and this meeting will afford an opportunity for the discussion of these problems and "swapping" ideas to help "Keep 'em Rolling," "Keep 'em Flying," and "Keep Democracy from Dying."

◆

NAT'L CHEM. EXPOS. TO SHOW WAR AID

The National Chemical Exposition, sponsored by the Chicago Section of the American Chemical Society, will be held November 17 to 22 at the Stevens Hotel in Chicago. The list of exhibitors already under contract and many who have made space reservations include the names of some of the country's most outstanding firms in the chemical industry.

The National Industrial Chemical Conference will be held in conjunction with the exposition, with noted industrial chemists, educators, and manufacturers invited to make addresses and lead the discussions.

"The show and conference will be an essential part of the industry's war effort," said Victor Conquest, chairman of the show committee. "It has been said that 'battles in 1943 and 1944 will not be won with equipment modern in 1942.' Scientific research and engineering cannot sit idly by during this war emergency. It is within the bounds of reason that the research laboratory and engineering table may win the war for us or our enemies."

Marcus W. Hinson is show manager, with headquarters at 110 North Franklin Street, Chicago.

Aside from finish Appleton Felts are preferred for their quality, design, uniformity, dependability and service-today's standard for those characteristics mills look for in felts. Ever since 1890 Appleton Felts have kept pace year after year with the rapid progress of the paper industry, so that today Appleton Felts meet the requirements of modern paper mill high speed production.

make APPLETON FELTS good paper

Appleton Woolen Mills

APPLETON • WISCONSIN

NAMES *in the* NEWS

Personals

A. B. HANSEN NOW PRES. OF NORTHERN

A. B. Hansen has been elected president of Northern Paper Mills at Green Bay, Wisconsin, the board of directors announced recently. In that post he succeeds Earle Murray, who remains chairman of the board, a title which

A. B. Hansen

he has held about four years with the presidency following the passing of the late W. P. Wagner. Mr. Hansen had been executive vice president and general manager since coming to Northern in October, 1935, and retains the manager's position with the new one.

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DR. WISE HAS FULL-TIME APPT. AT THE INSTITUTE

An announcement has just been made by the Institute of Paper Chemistry of the appointment of Dr. Louis E. Wise as research associate and instructor in wood chemistry at the Institute of Paper Chemistry. Dr. Wise is well known in the fields of wood chemistry, cellulose, pulp and paper for his research and review publications in these fields and particularly as co-author, with L. F. Hawley of the Forest Products Laboratory, of *The Chemistry of Wood*, published in 1926.

Dr. Wise received his Ph.D. degree from Columbia University. His broad experience in the field of chemistry is indicated by the following positions: Instructor in biochemistry, Columbia University, 1912-1913; instructor in general chemistry, University of Missouri, 1913-1914; biochemist, U. S. Department of Agriculture, 1914-1918; chemist, Bureau of Aircraft Production, 1918-1919; research chemist, E. I. du Pont de Nemours & Company, 1919. Following World War I, he assumed the duties of professor of forest chemistry at the New York State College of Forestry at Syracuse University, where he remained until 1932. Because of ill health at that time, he was forced to give up active work in the North, but was given the title of professor emeritus at the College and as research associate during the summers maintained his contacts with the work being carried on at Syracuse. From 1932 to 1941 he lived at Winter Park, Florida, where he continued his writing and abstracting; during this period he held the position of professor of organic chemistry at Rollins College for the years 1933 to 1937. During the fall of 1941, he gave the course in wood chemistry at the Institute and now has accepted a full-time appointment.

Dr. Wise has some fifty-odd publications and patents to his credit, covering the fields of pure organic chemistry, essential and fatty oils, soil chemistry, biochemistry, wood chemistry, pulp and paper. He has been particularly interested in cellulose and hemicelluloses, with special reference to the isolation and properties of arabogalactan from larchwood. More recently he has taken out patents (with F. C. Peterson) on the pulping of wood by the action of organic amines. At present, he is engaged in a thorough revision of Hawley and Wise's *Chemistry of Wood*, which is being carried out with the assistance of some fourteen experts in the fields of wood, lignin, cellulose, etc.

Dr. Louis E. Wise

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GEO. MEAD MADE BOARD CHAIRMAN— FERGUSON, PRES.

At the annual meeting of the board of directors on May 1, The Mead Corporation, Chillicothe, Ohio, elected its president, George H. Mead, chairman of the board. Mr. Mead is succeeded

Geo. H. Mead

as president by Sydney Ferguson, company vice president, who has been located in New York.

Other personnel changes were as follows: C. R. Van de Carr, Jr., formerly a vice president is now executive vice president; Speed Warren, Alan G. Goldsmith and J. O. Mason are vice presidents; Murray Smith, secretary, and A. H. Mahrt, treasurer.

Mr. Mead is president of the American Paper and Pulp Association.

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▶▶▶ At the annual meeting held in Toronto, Ontario, on April 2, *Leslie E. Blackwell* was elected a director of Corrugated Paper Box Company, Ltd., to fill the vacancy created by the resignation of W. J. Hilton.

INCREASES PRODUCTION

PRODUCTION and uniformity of product are among the major problems confronting most paper mills today. The capacity of any paper machine is only as great as the capacity and efficiency of the slice on the paper machine. Therefore, the Bagley and Sewall Engineering Department made an extensive study of this slice situation. The *new* Bagley and Sewall Slice is an outstanding result of this survey.

The simplicity and ease of adjusting the flow of stock to the wire by means of this *new* slice provides a very desirable assistance in forming a level and well laid sheet of paper.

The whole design of this slice lends itself to quick, accurate and dependable adjustment, without cumbersome or complicated equipment.

In every instance where one of these Bagley and Sewall Slices has been installed, not only has production been greatly increased, but a more uniform and level sheet has been produced.

An illustrative and descriptive bulletin is available.

THE BAGLEY & SEWALL CO.

WATERTOWN, NEW YORK

BUILDERS OF FINE PAPER MACHINES AND PAPER MAKING EQUIPMENT

PARKER SUCCEEDS SENSENBRENNER AS PRES. OF K-C

After serving the Kimberly-Clark Corporation, Neenah, Wisconsin, for 53 years, F. J. Sensenbrenner has resigned as president. Mr. Sensenbrenner joined the firm in 1889 as a bookkeeper, and for many years prior to becoming president at the death of J. A. Kimberly in 1928, he served as first executive officer of the company. During his long career, Mr. Sensenbrenner has been one of the top men

F. J. Sensenbrenner

in the paper industry; he served as president of the American Paper and Pulp Association in 1935 and 1936.

Mr. Sensenbrenner is succeeded by Cola G. Parker, who will be the third president of the Kimberly-Clark organization. Mr. Parker is a graduate of the University of Chicago Law School and later served many years as counsel to the American Paper and Pulp Association. He joined the Kimberly-Clark concern in 1937 in the capacity of vice president, director, and member of the executive committee.

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SUGGESTION WINS GAIR EMPLOYEE A $100 WAR BOND

The suggestion system is used by many industrial organizations, and it has been proved that employees can offer ideas that are valuable.

A recent award by Robert Gair Company, Inc., has special significance due to the heavy use of paperboard for Defense and Civilian use. Andrew Benassi, press operator at the plant of the Bogota Paper & Board Corporation, Bogota, New Jersey (a Gair subsidiary), received a $100 War Bond on April 3 for his suggestion.

The award-winning suggestion provided that by a revision in the layout of boxes for die cutting, a reduction in the amount of paperboard required could be effected. In addition to the Bogota plant, this suggestion will be adopted in the other Gair plants and will, in all probability be followed by other container manufacturers.

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DR. VAN HORN RESEARCH ASST. AT INSTITUTE

The Institute of Paper Chemistry has announced the appointment of Dr. Willis M. Van Horn as a research assistant. He will be a member of the organic group, which is under the supervision of Dr. Harry F. Lewis, and his immediate duties will be in the field of the disposal of trade wastes encountered in the pulp and paper industry. Dr. Van Horn took his undergraduate work at Milton College and his graduate work at the University of Wisconsin, receiving his Master's degree in 1930 and his Doctorate in 1932. Part of his work was taken under Prof. Chauncey Juday, a well-known authority on fresh water (lake) biology. During his graduate study he served as assistant in the Department of Zoology and later he taught at Alfred University, Alfred, New York, Wisconsin State Teacher's College at Superior, and Bradley Polytechnic Institute, Peoria, Illinois. He is at present an assistant professor of biology at Lawrence College, with which the Institute is affiliated.

Dr. Van Horn has worked with the New York State Fish Commission on fresh water pollution and with the committee on water pollution of the Wisconsin State Board of Health with

Papermaker Wanted by Nat'l Bur. of Stand.

The National Bureau of Standards, Washington, D. C., needs a papermaker to assist in the work of the paper mill of the Paper Section. The work involves the operation and maintenance of semi-commercial papermaking machinery which comprises all units required for conversion of raw material into paper, and for processing of papers such as super-calendering, coating, and surface sizing. Experience in the operation of a fourdrinier paper machine is an essential requirement. Anyone interested in the position should communicate with the Bureau.

For suggesting a new method of cutting paperboard, Andrew Benassi, pressman at Bogota Paper & Board Corp., is presented with $100 War Bond by S. R. Cahoon, manager of Robert Gair Company container plants. Looking on at the presentation are: F. C. Costello (extreme right), Bogota plant manager, and C. F. Burke (next to Mr. Benassi), plant superintendent. At the extreme left is J. P. Petretti, president of Mr. Benassi's union.

SPEED

WITHOUT SACRIFICING WORKMANSHIP . . .

. . In Piping Fabrication for Paper Mills

TIME is America's most precious commodity. Every hour, day and month saved in the construction of additional paper making facilities means just that much more material necessary for our war efforts.

For nearly 40 years Pittsburgh Piping has been in business to *save time* in fabricating and erecting power and process piping. During these years it has fabricated and erected complete piping systems for many of this country's best known paper mills.

The systematized pre-fabrication of large piping assemblies under controlled shop conditions makes possible faster construction schedules. Pittsburgh Piping's fabricating techniques also produce better, more accurate workmanship than is possible in the field.

Now with time at a premium, Pittsburgh Piping is ready to save months on the construction of paper mill piping systems, without resorting to any shortcuts which might adversely affect the quality.

PITTSBURGH PIPING & EQUIPMENT CO.
10 FORTY-THIRD STREET PITTSBURGH, PA

Pittsburgh Piping

special reference to the chemical treatment of lakes and streams and the algae disfiguration of lakes.

During the past four years Dr. Van Horn has also carried on a number of special studies at the Institute and has made significant contributions to the problems of trade wastes as related to the pulp and paper industry.

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DR. FRANK TONE RETIRES AS PRES. OF CARBORUNDUM

Dr. Frank J. Tone, widely known electrochemist, retired on April 22 as president of the Carborundum Company, Niagara Falls, New York, with which he had been associated since

Dr. Frank J. Tone

1895. Dr. Tone was appointed chairman of the board of directors, a new position. Arthur A. Batts, secretary, became president.

Plant officials announced that instead of vacations this summer, Carborundum's 4,000 employees will receive extra compensation.

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▶▶▶ Word is received from *V. L. Tipka* that he has resigned his position as research engineer of the Hawley Pulp & Paper Company, Oregon City, Oregon, and has accepted a position as engineer for the Pacific Coast Chemical & Processing Company, Aberdeen, Washington.

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▶▶▶ Formerly manager of the York Plant of the Certain-teed Products Corporation, *R. B. Whittemore* is now associated with the S. Austin Bicking Paper Manufacturing Company, Downingtown, Pennsylvania, in the capacity of assistant general manager.

HUSS AND AVERY ARE NEW MEMBERS ON ACME BOARD

At the annual meeting of stockholders of Acme Steel Company, Chicago, on April 21 two new members

W. Sheridan Huss

were elected to the board of directors and the five present members were re-elected. Guy T. Avery, works manager of the company's plant at Riverdale, Illinois, and W. Sheridan Huss,

Guy T. Avery

sales manager of the central district, are the new men elevated to the board posts. They fill vacancies caused by resignations of James E. MacMurray, now residing in Pasadena, California, and F. C. Gifford, who retired a year ago because of ill health.

Present directors who were re-elected are R. H. Norton, chairman of the board; C. S. Traer, president; C. M. MacChesney, first vice-president and secretary; C. J. Sharp, vice-president and director of sales; and L. H. Whiting.

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▶▶▶ Chairman of the Water Committee of TAPPI, and a member of committee D-19 of A.S.T.M., *Dr. Lewis B. Miller* has joined the consulting staff of W. H. and L. D. Betz, Philadelphia. Dr. Miller was graduated from the State University of Iowa with a Bachelor's and Master's degree and received his Doctorate from Columbia University. He has been studying problems relating to water

Dr. Lewis B. Miller

purification and sewage disposal, and he has written 35 papers, most of which deal with industrial process water problems.

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▶▶▶ The appointments of *John J. Cahill* as vice president in charge of sales and *Walter E. Piper* as assistant sales manager to fill vacancies caused by the passing of the late V. Howard Larson were announced by The Crystal Tissue Company, Middletown, Ohio. Mr. Cahill has been associated with this company for sixteen years, during the past three years as assistant sales manager, and both he and Mr. Piper are well known to the paper industry.

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▶▶▶ Because of ill health, *W. C. Buchanan* has resigned as president of Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin. However, he retains his membership on the board of directors and executive committee, which positions he has held for several years. *Walter Geist,* formerly vice president, was elected president to succeed Mr. Buchanan.

CONSIDER THESE IRON BODY VALVES TO SAVE BRONZE

THE "KING-CLIP" — a husky iron body gate valve which employs bronze for the internal working parts only. For many services, the "King-clip" will serve equally as well as a bronze gate valve. Easily taken apart for cleaning. A valve that withstands hard and continuous usage.

THE "FERRENEWO" — an iron body globe valve that may be used instead of bronze valves for many services. All internal parts are made of non-corrodible alloys and are renewable. Seat and disc are regrindable. The "Ferrenewo" will give excellent service with negligible upkeep cost.

Investigate the adaptability of these iron body valves to your needs.

Fig. 1640
"King-clip" Gate Valve
150 lb. S. P.

Fig. 1021
"Ferrenewo" Globe Valve
150 lb. S. P.

ESTABLISHED 1862
THE LUNKENHEIMER CO.
"QUALITY"
CINCINNATI, OHIO, U. S. A.
NEW YORK CHICAGO
BOSTON PHILADELPHIA
EXPORT DEPT. 318-322 HUDSON ST., NEW YORK

Since virtually all materials used in the manufacture of valves are on the list of critical materials, valve users are urged to furnish the highest possible preference ratings on their orders. This will be of mutual helpfulness.

LUNKENHEIMER VALVES BOILER MOUNTINGS LUBRICATING DEVICES

FORSBERG MADE PURCH. AGENT OF JESSOP STEEL CO.

Formerly assistant purchasing agent of the Jessop Steel Company, Washington, Pennsylvania, R. G. Forsberg has been appointed purchasing agent of the company. He succeeds R. J. Murray, who is now secretary and assistant treasurer.

R. G. Forsberg

Prior to joining the Jessop organization in April, 1941, Mr. Forsberg served eight years in the purchasing department of the Timken Roller Bearing Company, Canton, Ohio.

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R. E. LANE GOES WITH SUTHERLAND

To succeed the late Walter B. Hadley as superintendent of its Specialties Division, the Sutherland Paper Company, Kalamazoo, Michigan, has appointed Richard E. Lane, superintendent of the Eddy Paper Corporation's box plant at Three Rivers, Michigan. He will assume his new duties about June 1.

Mr. Lane has been in the paper business for about 15 years, and was with the Continental Container Corporation's Boston plant as superintendent for five years before he joined the Eddy Corporation in 1933. George Radke, who has been with the Eddy Corporation for about ten years, will succeed Mr. Lane as box plant superintendent.

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▶▶▶ The vacancies on the boards of the Dominion Tar and Chemical Company, Ltd., and the Howard Smith Paper Mills, Ltd., caused by the passing of Sir Herbert Holt, have been filled by *Harold Crabtree*, president of the Howard Smith Paper Mills, and *Arthur B. Wood*, president and managing director of the Sun Life Assurance Co. of Canada, respectively.

▶▶▶ The retirement of *Joseph D. Reed, Jr.*, manager of the Cleveland office of The Champion Paper & Fibre Company, Hamilton, Ohio, has been announced. The difficulty of replacing Mr. Reed has been increased because his assistant, Herbert W. Suter, Jr., has entered the Army. However, the company feels it has made a happy choice in C. F. Chaplin, who has been with the company for several years at Hamilton and Chicago. Mr. Chaplin begins his duties on May 15.

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▶▶▶ Milwaukee City Testing Laboratory Engineer since 1927, *C. A. Wiepking* has resigned his position. He will become a senior engineer at the U. S. Forest Products Laboratory in Madison, Wisconsin.

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▶▶▶ President of Powell River Company, Powell River, British Columbia, *Harold S. Foley*, has been appointed a member of an advisory committee under the Wartime Prices and Trade Board to consider means of simplifying production and distribution of newsprint.

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▶▶▶ Formerly president of the Mixing Equipment Company, Rochester, New York, *F. L. Craddock* has been appointed sales manager of the Mixing and Process Equipment Division, Edge Moor Iron Works, Inc., Edge Moor, Delaware.

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▶▶▶ The Board of Directors of Diamond Alkali Company, Pittsburgh, held a meeting May 4 and elected *George S. Cooper* executive vice president. Mr. Cooper has been associated with the company since 1919.

◆

F. I. LACKENS MADE V.P. OF N.I.A.A.

Frederick I. Lackens, advertising manager of The Hays Corporation, Michigan City, Indiana, was appointed vice president of the National Industrial Advertisers Association at a meeting of the board in Cleveland on March 27. He will complete the unexpired term caused by the resignation of Louis Ott, advertising manager of The Ohio Brass Company, Mansfield, Ohio.

Mr. Lackens is a past president of the Chicago Industrial Advertisers, which is the Chicago Chapter of the National Industrial Advertisers Association, and was conference chairman of the 1941 Regional Conference there. More recently he has served as chairman of the National Industrial Advertisers Association committee on chapter programs.

▶▶▶ A director of the Pittsburgh Plate Glass Company, Pittsburgh, Pennsylvania, and head of the company's merchandising division, *H. B. Higgins* has been elected executive vice president. He has been associated with the company since 1905. He became manager of the Kansas City warehouse in 1912; manager of plate glass sales in 1917; general sales manager in 1925; and vice president in 1928.

H. B. Higgins

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▶▶▶ Chairman of the annual three-day conference of the 151st Rotary International District to be held in Kalamazoo, Michigan, May 17, 18, and 19 will be *Glenn Stewart*, advertising manager of the Kalamazoo Vegetable Parchment Company. Mr. Stewart has been active in Rotary International activities for a number of years.

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▶▶▶ *L. J. Belnap*, president of Consolidated Paper Corporation, Montreal, Quebec, and a director of the Bank of Montreal and the Canadian Pacific Railway, has been elected a director of British American Oil Company, Ltd.

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▶▶▶ Following a meeting of the Board of Directors of Westinghouse Electric and Manufacturing Company, Schenectady, New York, the following executives were elected to the rank of vice president: *Andrew H. Phelps*, manager of purchases and traffic; *L. E. Osborne*, manager of the steam division; *Frank C. Reed*, president of the Westinghouse Electric Elevator Company (a subsidiary); and *Walter C. Evans*, general manager of radio, X-ray and broadcasting divisions.

LEADING PAPER MILLS REPORT

on Monsanto Sodium Aluminate for Sizing at controlled pHs

Many leading mills, manufacturing many different types of paper, have found that by using Monsanto Sodium Aluminate in conjunction with alum they are able to get satisfactory sizing at *any* desirable pH.

What this has meant in terms of better machine conditions, more efficient production and better paper is revealed in the summaries of their experience listed at the left.

☆ ☆ ☆

THE EXPLANATION: Sodium Aluminate is an alkaline source of alumina as contrasted with alum, an acid source. By varying the proportion of sodium aluminate and alum used in the rosin sizing process it is possible to obtain any required amount of alumina at any desired pH. This permits greater flexibility in the sizing process and is a means of realizing the many benefits obtained by sizing paper at higher pHs.

☆ ☆ ☆

SPECIFICATIONS: Monsanto Sodium Aluminate contains a minimum of 90% Sodium Aluminate, yet it remains *stable* in 6% water solutions for several weeks.

This exceptional stability keeps scale formation in dissolving tanks and pipe lines at a minimum.

Readily soluble in water, Monsanto Sodium Aluminate is low in insolubles and has the same iron content as iron-free alum on the alumina basis.

☆ ☆ ☆

THE COST: Many cases are on record where the use of Monsanto Sodium Aluminate has resulted in a substantial net saving over the cost of the material. Compared with other alkalis sometimes used with alum for pH control, it is usually more economical in first cost and invariably its use results in greater benefits.

For full details and experienced technical service, inquire: MONSANTO CHEMICAL COMPANY, Merrimac Division, Everett Station, Boston, Massachusetts.

IMPROVED SIZING

Manufacturers of hard-sized, kraft paper report:

1. Average pH without Sodium Aluminate 4.8 — average pH with Sodium Aluminate 5.5.
2. Average amount of Sodium Aluminate used 0.5%.
3. Average percent reduction in alum furnished 25.0%.
4. A definite increase in sizing due to ability to supply sufficient alumina and maintain optimum pH.
5. Reduction in degradation of fibres by raising pH.
6. A more efficient setting of color.

MORE PERMANENT PAPER

Manufacturers of high grade rag and sulfite papers—including bond, ledger and onion skin—report:

1. Average pH without Sodium Aluminate 4.5 — average pH with Sodium Aluminate 5.7.
2. Average amount of alum used 1.75%.
3. Average amount of Sodium Aluminate used 0.6%.
4. From no effect to marked improvement on sizing.
5. Reduction in sulfate content of the paper.
6. pH of the paper raised as high as 7, giving increased resistance to aging.

BETTER MACHINE CONDITIONS

Manufacturers of groundwood specialty papers report:

1. Average pH without Sodium Aluminate 4.3 — average pH with Sodium Aluminate 5.4.
2. Average amount of Sodium Aluminate used 0.3%.
3. Average percent reduction in alum 25.0%.
4. Elimination of sticking of wet web.
5. Better machine efficiency and improved sheet formation.

HELP! Prompt return of empty tank cars, carboys and returnable drums will help speed your *next* shipment of Monsanto chemicals . . . by helping to relieve critical shortages in shipping equipment.

MONSANTO CHEMICALS

Necrology

F. J. TIMMERMAN

Frank J. Timmerman, one of the most prominent figures in the paper industry, passed away April 20. Until his retirement last June, Mr. Timmerman had been mill manager of Northern Paper Mills, Green Bay, Wisconsin. He was 49 years of age.

Three years ago, while on a business trip for his company, Mr. Timmerman sustained severe injuries from an automobile accident in the East, and the effects of that experience, caused him to retire from Northern on June 1, 1941.

The son of the late Mr. and Mrs. Frank Timmerman, Sr., of Green Bay, Mr. Timmerman was born there and received his early education in schools of that city.

He made the paper business his life's work and rose from the ranks to become machine tender, superintendent, and finally mill manager. His entrance into the field he loved so well began when he was 16 years of age and his first job was at Northern. After a few years he received a chance of promotion and went to a mill at Rhinelander, Wisconsin, and later to Rothschild, Wisconsin.

F. J. Timmerman

In 1921, Mr. Timmerman returned to Northern to become mill superintendent, and in 1929 he was promoted to mill manager. During his active years, he became devoted to improvement of the industry and served one term as president of the American Pulp and Paper Mill Superintendents Association. He also took a leading part in the committee work of that organization. When the Northwestern Division of the Superintendents Association held its annual meeting in Green Bay last fall, Mr. Timmerman was made an honorary life member in recognition of his services.

Surviving are the widow, two sons and three daughters.

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▸▸▸ Chief consulting engineer of the Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin, since 1937 and an employee of the company for 36 years, *Robert F. Vogt* passed away on April 17. Mr. Vogt's professional career began in the United States about 40 years ago, when he came here from Switzerland where he was born. He was a graduate of the Swiss Polytechnicum at Zurich. He was 62 years of age, and is survived by his widow and a son.

◆

JAMES M. MURRAY

Labor adjuster for the International Paper Company with headquarters in Montreal, James M. Murray, 65, passed away at his home on April 27. Mr. Murray and his three brothers, William, Richard, and John all chose newsprint manufacturing as a trade and began their careers in the Fort Edward mill of the International Paper Company. William Murray, who passed away six years ago, was superintendent of the International mill at Livermore Falls, Maine, for many years; Richard Murray was superintendent of the International plant at Thomson, New York, until he passed away two years ago. John A. Murray, who survives, is a paper inspector at the Corinth plant of this company.

James M. Murray served as superintendent of the International mill at Berlin, New Hampshire, and later went to Three Rivers, Quebec, as mill superintendent. After that, in 1927, he was sent to Hull, Quebec, where he assisted in supervising construction of the International plant there.

Surviving are his widow and two daughters.

◆

WALTER B. HADLEY

Superintendent of the Specialties Division of Sutherland Paper Company, Kalamazoo, Michigan, Walter B. Hadley passed away April 12.

Mr. Hadley was born in New York City. From boyhood he lived in Middletown, Ohio, where he began his rise in industry. He was superintendent of The Gardner Harvey Company in Middletown, later was general manager of The Mead Corporation plant at Harriman, Tennessee, and then general manager of the Pioneer Flintkote Company, Los Angeles, California. He was general manager of the Detroit Paper Products Corporation, Detroit, Michigan, until he became affiliated with Sutherland three years ago. Mr. Hadley also was active in affairs of the American Pulp and Paper Mill Superintendents Association.

He was 52 years old, and is survived by his widow, a son and daughter.

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DR. FRITZ STRAUS

Dr. Fritz Straus, an official of the Ecusta Paper Corporation, Brevard, North Carolina, and an internationally known professor of chemistry, passed away April 8 at Hollywood, Florida. He was 65 years old.

Dr. Straus, a brother of Harry Straus, president of the Ecusta Company, formerly was professor of chemistry and dean of the University of Berlin. He had been connected with the Ecusta plant for the past three years, and, although he had never held an industrial position prior to that time, associates said he had rendered outstanding assistance and technical advice in the work of the company.

Dr. Straus is survived by his widow and two brothers.

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▸▸▸ Having served in the paper industry for nearly half a century, *Henry Nicholson* passed away at his home in Glen Park, New York, April 23, at the age of 72. Mr. Nicholson was born in Sunbury, Canada, and came to northern New York about 50 years ago. His first job in the industry was at Watertown, New York, where he was chief engineer for the International Paper Company. Later he was steam engineer in the old Black River mill of the St. Regis Paper Company. At the time of his retirement eight years ago Mr. Nicholson was steam engineer for the Brownville Board Company, Brownville, New York.

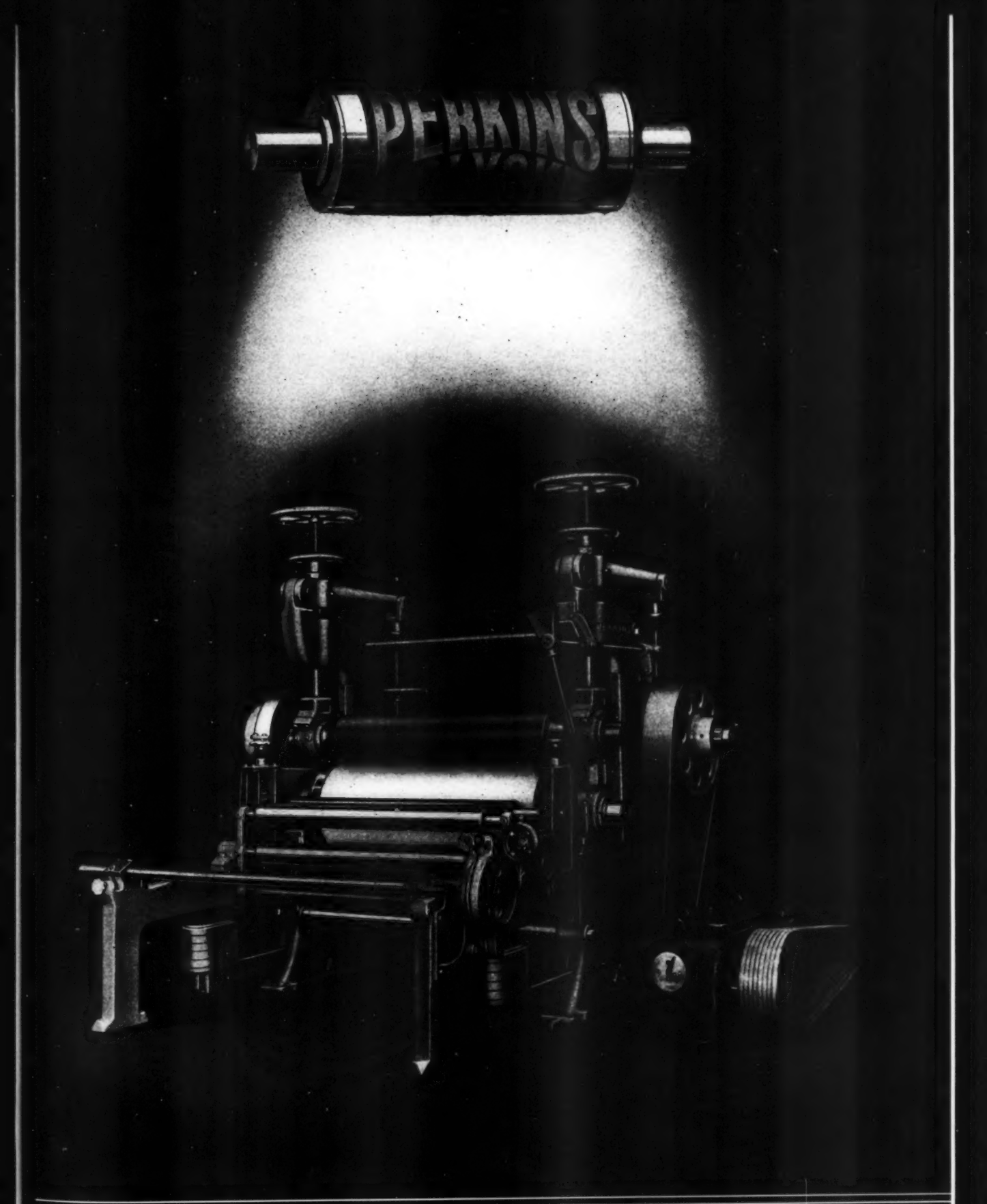
◆

JOHN C. SHERMAN

John C. Sherman, 73, in recent years an engineering consultant for pulp and paper manufacturers in the Attleboro, Massachusetts, district, passed away April 12 at his Attleboro home following a heart attack. Mr. Sherman was 73 years of age.

Born in Bucksport, Maine, Mr. Sherman attended Victoria University, Liverpool, England, and Massachusetts Institute of Technology, from which he was graduated in 1895. He served as associate editor of *Munsey's* magazine from 1895 to 1908, when he joined the editorial staff of *Youth's Companion*. Two years later he became editor of trade publications for the Westinghouse company. He also had been in the publishing business before becoming a paper industry consultant.

Surviving are his widow and a son.



B. F. PERKINS & SON, INC.

ENGINEERS AND MANUFACTURERS

HOLYOKE • • • MASSACHUSETTS

Convention Papers . . . Abridged

Calcium Bicarbonate Removal from Water in Sulphate Mills

H. W. FRAZER
Chemical Engineer,
International Filter Company

It is often said that "hardness" in the water is objectionable in kraft mills. Actual experience indicates that only certain kinds of hardness usually cause difficulty in mill operations—with the exception of the boiler plant. Calcium and magnesium sulphates and chlorides—called permanent or *non-carbonate* hardness—are soluble at the temperatures and concentrations encountered throughout the mill and they do not cause difficulty by their reactions with the cooking and bleach liquors. They cause concern only in the boiler plant, and in the manufacture of dissolving pulps where ash content is highly important. Temporary or *carbonate* hardness in natural waters is usually calcium and/or magnesium bicarbonates. They are precipitated at higher temperatures often encountered in mill operation and react with cooking and bleach liquors to form insoluble products. When a solution of calcium bicarbonate contacts an alkali such as calcium or sodium hydroxide, the relatively insoluble normal carbonate is produced. The crystalline precipitate adheres to metal surfaces forming an objectionable scale. The magnesium bicarbonate also reacts with these alkalies but its normal carbonate is relatively soluble and further reacts with the alkali to give an amorphous nonadherent magnesium hydroxide precipitate. Its physical form is such that scaling difficulties are not evident.

The calcium carbonate scale found in kraft mills using water containing appreciable amounts of calcium bicarbonate is troublesome and expensive—but the tremendous volume of water used in the mill makes conventional water-softening methods expensive. Reduction of treatment costs to a minimum involves the elimination of treating chemicals consumed by the non-carbonate hardness and magnesium bicarbonate since these are not objectionable.

There are three general methods of water softening; sodium zeolite, hydrogen zeolite, and lime-soda. The sodium zeolite process is flexible only insofar as the hardness of the effluent is adjusted by mixing completely softened water with raw water. It is not selective as to kind of hardness removed. The hydrogen zeolite process can be made selective with regard to removal of bicarbonates only, but there is no positive control over the removal of calcium bicarbonate without affecting the magnesium. Lime-soda softening offers several choices of treatment to obtain specific results. Complete lime-soda treatment provides minimum total hardness; split treatment gives a calcium carbonate-magnesium hydrate sludge in the first stage and a relatively pure calcium carbonate sludge in the second stage, with a low hardness in the treated water. In sulphate process mills the most important variation of the lime-soda process is selective treatment with lime and a small amount of coagulant for removal of only the objectionable calcium bicarbonate and production of a calcium carbonate sludge which may be reburned for the causticizing plant. Other variations are possible, but their limited application in the sulphate process mill does not warrant detailed consideration here.

One other method of calcium bicarbonate removal should be mentioned, and that is direct neutralization with sulphuric acid. Conversion of the bicarbonate to the sulphate does not reduce the total hardness so cannot be classified as softening. It does prevent the scaling difficulties encountered when the untreated bicarbonate water is used.

Selective removal of calcium bicarbonate, which combines lowest treatment cost and maximum value of byproduct, has been practical only since the development of accelerated lime treatment.

The Accelator process causes the chemical reactions to take place in the presence of previously precipitated and coagulated slurry. The treating chemicals are thoroughly mixed with the slurry, then brought into contact with the raw water in the primary mixing and reaction zone. The reactions occur on the surface of the old particles and the resulting "integrated floc" is almost immediately ready for separation.

The almost instantaneous production of essentially stable water with the theoretical amount of chemicals, permits "selective" removal of only that part of the hardness which causes trouble in the mill.

The savings made possible by selective removal of calcium bicarbonate from the general mill supply must be evaluated in the light of local conditions at each mill. The experiences of mills now using this method of treatment indicate that appreciable savings can be effected in almost every operation.

Decreased scaling of lines and strainers gives better relief and circulation; also rate of heat transfer in exchangers is increased with a net increase in over-all efficiency. The reduction in scale in heat exchangers used for indirect heating of liquor increases the rate of heat transfer, saves steam, and reduces the time out for cleaning. When water is used to make up alkali cooking liquor and for dilution to digesters a saving in soda, equivalent to the chemical required for precipitation of the bicarbonate, is effected.

Reduction of scale formation in the evaporators allows more efficient operation by producing more concentrated black liquor with minimum steam requirement. This is interrelated with the savings in soda

This is the third installment of abridgments of papers presented at the annual meeting of the **Technical Association of the Pulp and Paper Industry,** held in New York City, February 16-19, 1942. Monthly installments of these abridgments will appear in succeeding issues.

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Fig. 1531

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due to better pulp washing mentioned later and usually the two are considered together. Low vacuum obtained by use of nonscaling water in low-pressure side of evaporators results in definite steam economies.

Deposition of scale on vacuum pulp washer wires seriously reduces the capacity of the washers and the efficiency of washing. The greater volume of wash water required increases cost of evaporation and the lower recovery of soda in black liquor from the first washer results in appreciable soda losses. Prevention of the scale formation results, therefore, in a fourfold saving. First, washer capacity is materially increased; second, appreciable savings in soda result from stronger black liquor and more complete removal of soda in the first washer; third, wire life is prolonged because destructive cleaning with acid is minimized; and fourth, acid formerly used for cleaning is saved. In addition there is less tangible but very worth-while saving resulting from elimination of shutdowns for cleaning.

Since water acts as conveyor of pulp through the screens scale formation on screens is almost as serious as on the pulp washers. In some cases the elimination of scale due to calcium bicarbonate in the water has resulted in capacity increases estimated at about 25 per cent. Reduction of fiber losses, increase in screen life, and elimination of acid and time out for cleaning are also appreciable. In one mill, scale on the decker seriously interfered with the formation of a uniform sheet of pulp and excessive corrosion attending the acid cleaning made early replacement of the decker imperative. Selective removal of calcium bicarbonate eliminated the scale practically completely.

The effect of calcium bicarbonate removal on the life of felts and length of time between washings is difficult to evaluate in dollars and cents but experience proves that benefits are realized. The entire absence of free CO_2 in the treated water has been given credit for better sheet formation. (Keller, E. L., Simmonds, F. A., and Baird, P. K. *Tech. Assoc. Papers* 23:158-162, June, 1940.)

When calcium bicarbonate contacts calcium or sodium hypochlorite, a reaction takes place with the formation of two molecules of calcium carbonate precipitate for each molecule of calcium bicarbonate originally present. In addition to the difficulty and expense involved in this scale formation in the washing and screening operations following bleaching, this reaction also affects the final brightness of the pulp. Experience indicates that color reversion is due to the high alkalinity of the water and elimination of the calcium bicarbonate will decrease alkalinity and color reversion. In some mills an acid stabilization treatment is employed to neutralize the alkalinity and minimize color reversion. This is, however, a relatively expensive treatment as can be shown by comparison of the amount and cost of acid used with the amount and cost of lime required. Further, the low pH and high CO_2 content of the acid neutralized is objectionable.

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★

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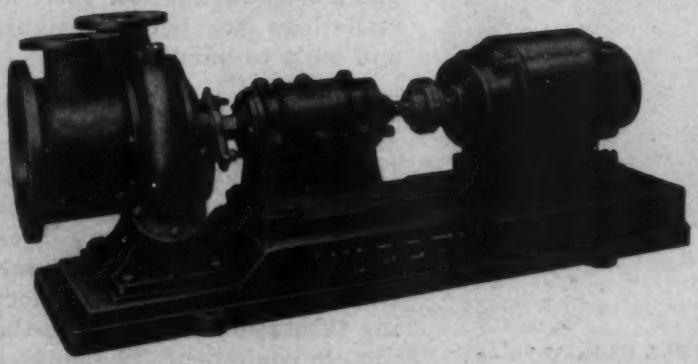

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Structural Viscosity Studies of Coating Clay Compositions*

GEORGE H. SHEETS, Development Engineer
The Mead Corporation

A survey of the literature reveals that little experimental data have been reported on the flow properties of clays with respect to paper manufacture and, therefore, it was felt that a fundamental study of these flow properties would be desirable. Through such a study, it should be possible to account for some of the factors which are of importance in regulating the flow properties of clays. Knowledge of this kind is important not only to the paper manufacturer but also to the clay producer.

Any study of the flow properties of concentrated clay suspensions containing a dispersing agent involves the measurement of not only Newtonian but also of anomalous flow, including plastic flow, dilatancy, and thixotropy. The measurement of the latter two properties, especially thixotropy, presented a problem in itself, because no instrument or techniques suitable from the standpoint of this investigation had been developed. A promising beginning in the design of a proper instrument utilizing a principle similar to that used by Roder (Roder, H. L. "Rheology of suspensions." Thesis. Amsterdam, H. J. Paris, 1939. 86

(*) A portion of a thesis submitted in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Doctor of Philosophy from Lawrence College, Appleton, Wisconsin, June, 1941. This work was carried out under the direction of Philip Nolan.

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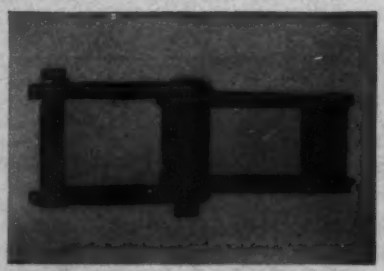

④ **"YES, IF YOU CAN CHANGE** over to Z-Metal Durobar chain belts (Z-Metal chain belts, you know, are 25% stronger than malleable iron and far more resistant to corrosion and abrasion), you'll get conveyors that will stand up!"

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p.) had been made by Williams (Williams, E. H. Unpublished work, The Institute of Paper Chemistry, 1940), but this instrument had not been completely developed. Therefore, the first phase of this investigation constituted a study of this instrument, which led to modifications in design, and the development of suitable techniques for its use.

The completely developed instrument is shown in Figures 1 and 2. The construction of the instrument is best seen in Figure 2. The water bath (A) and the circular trough (B) of the instrument are constructed of sheet copper, and the lower base plate (C) is of brass. Both the shearing plate (D) and the upper base plate (E) are also of brass. The rotating head (F) is the top part of an ordinary Stormer viscometer. The large gear, which is normally within the casing (G), has been removed. To eliminate friction as far as possible, the weight of the rotating member is counterbalanced with weights (on a pan) through a thread of negligible torsion constant, as shown in Figure 1. The circular trough (B) and the shearing plate (D) are coated with a chlorinated-rubber lacquer in order to make them impervious to attack by acid or alkali. H is a Cenco frictionless pulley.

The temperature of the material in the trough is maintained at a constant value by circulating water through the bath (A) from a constant temperature reservoir by means of a small centrifugal pump. The temperature of the water in the reservoir is regulated at 25±0.2 C. by a Cenco De Khotinsky thermo-regulator. The temperature control apparatus is clearly shown in the lower part of Figure 1.

The chief difference between this type of viscometer and other rotational viscometers, such as the Stormer or McMichael, is that, with this instrument, a measurement of thixotropy can be achieved. This is possible because the shearing body of this instrument is always contacting new material which has not been previously distributed during any given measurement.

Figure 1

A total of six clays (A-F) were studied in this investigation. Clays B, D, E, and F were from the same clay crude—a Georgia secondary clay. All four of these clays had received the same basic chemical treatment. Clay F was the coarse fraction and Clay D was the fine fraction of this clay crude, Clay E being an intermediate fraction between the Clays B and D.

Clay C was also a Georgia secondary clay, whereas Clay A was a primary clay.

In order to characterize these clays more completely, X-ray data and particle size measurements were obtained. The X-ray data and their interpretation were supplied by G. L. Clark of the University of Illinois. All the diffraction patterns, except that of Clay A, correspond exactly with kaolinite. Additional weak lines in the diffraction pattern of Clay A correspond to illite, which was identified quite positively. The data also indicate essentially the same size for primary particles. Thus, the apparent particle size differences of these samples must refer to secondary aggregates.

Particle size determinations on six clays were carried out by the Casagrande hyrdometer method (Hauser, Ernst A., and Lynn, J. Edward. *Experiments in Colloid Chemistry*. 1st edition, especially p. 110. Norton, F. H., and Speil, S., *J. Am. Ceram. Soc.*, 21:89-97, 1938). Specific gravities of the clays were measured by a typical pycnometer method employing kerosene in place of water.

The following procedure was found adequate for the preparation of large batches of hydrogen clay. Four pounds of the clay

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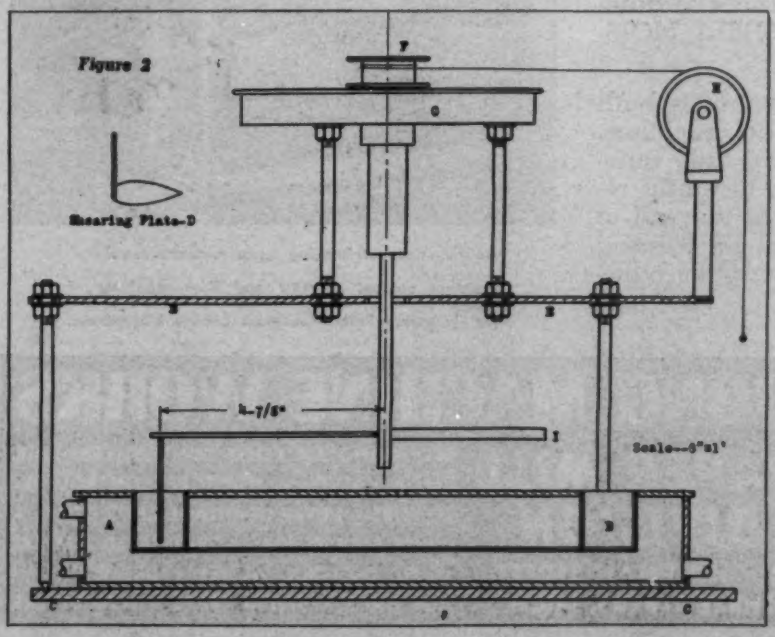
were made into a thin slurry, which was passed through a Büchner funnel (no filter paper was used) to remove any lumps. After filtering, the suspension was placed in a 5-gallon jar and sufficient technical hydrochloric acid and water were added to make 16 liters of 2 N acid. The suspension was stirred well and allowed to stand for about 24 hours. At the end of this time the clay had settled sufficiently so that about 10 liters of the acid solution could be decanted off. Fresh 2 N acid was added, the suspension again stirred, and allowed to settle. After three such acid treatments, the clay was washed free of acid by decantation. The end point of the washing was taken as the point where no chlorides could be detected in the supernatant wash water. After the washing was completed, the clay suspension was filtered on Büchner funnels and the filter cakes were air dried. Specially softened water with a purity comparable to that of distilled water (Zeo-Karb process) was used throughout the washing process.

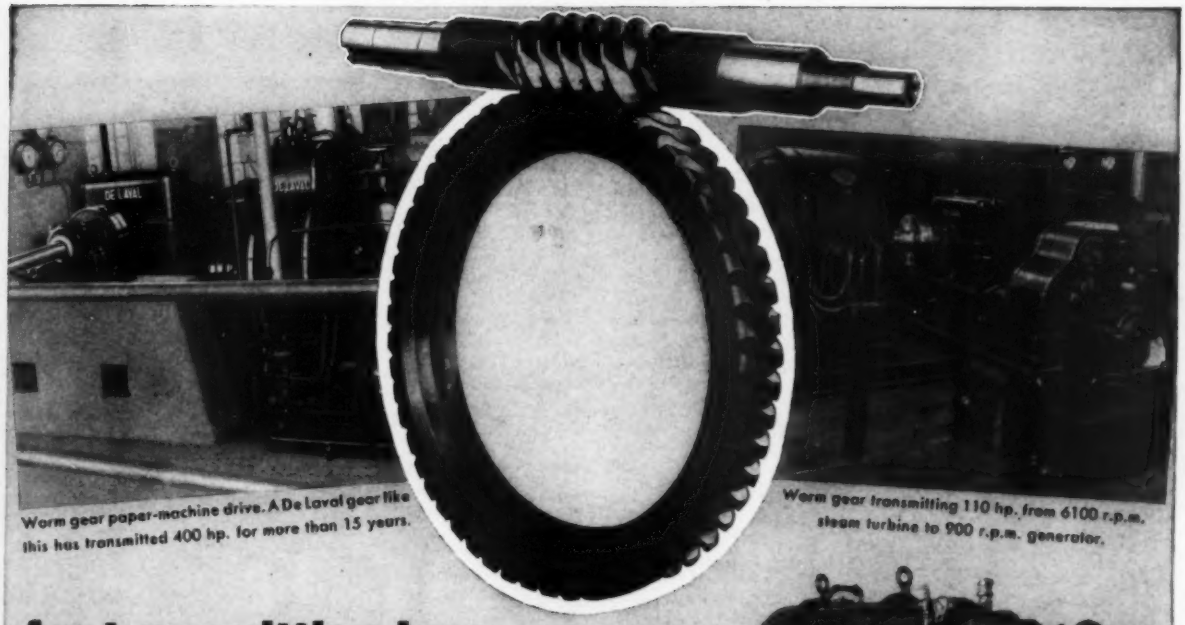


In this investigation two dispersing agents commonly used commercially were employed —sodium silicate and tetrasodium pyrophosphate.

To the proper amount of dispersing agent the correct volume of distilled water was added to give the desired solids content. To this mixture, which was stirred continuously by means of a Mixmaster, 600 or 800 grams of clay were added slowly. The slip was then allowed to mix for a standardized length of time. After mixing, the temperature was adjusted to 25 C. and 600 cc. were placed in the trough of the viscometer —this being enough to fill the trough to within ⅛ inch of its brim.

After the trough of the viscometer had been filled with the system to be measured, the removable top part of the viscometer was set in place, and the counterweight for reducing friction was attached. Enough weight was then attached to the driving cord to move the drag body through the suspension at a moderate speed. The first step was to determine if the system possessed thixotropic properties, which was done by the procedure outlined under the Measurement of Thixotropy.

If no thixotropic build-up was found, the measurement was greatly simplified, the pro-



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cedure for the measurement of Newtonian liquids being used. If the system has any tendency to settle out, it must be stirred with a spatula between speed-weight observations.

Clays A-C were made into slips of various solids contents and the flow properties were measured in the viscometer.

The outstanding conclusion concerning these results is that very wide differences in the flow properties of these three clays exist. The systems made from Clay A are to be classed as weakly dilatant systems; this dilatancy is observed to exist over a comparatively wide range of solids contents. This is to be compared with that of Clay C which possesses a high degree of dilatancy over a comparatively narrow range of solids concentrations. Clay B, on the other hand, did not exhibit dilatancy.

Another observation of pertinence is the difference in solids content corresponding to a given apparent viscosity for the various clays. In this particular case, it may be said that a clay slip prepared from Clay C and containing 70 per cent solids is equivalent in viscosity to a 60 per cent Clay B slip or to one with 55 per cent Clay A.

One other important conclusion from these data is that a single viscosity determination of a clay slip is not sufficient to give a true indication of its flow behavior, although this is a common mill practice.

In summing up the above discussion, it can be stated that the wide differences which exist in the flow properties of the three coating clays studied are to be attributed partly to a difference in hydrating ability of these clays and partly to differences in particle size.

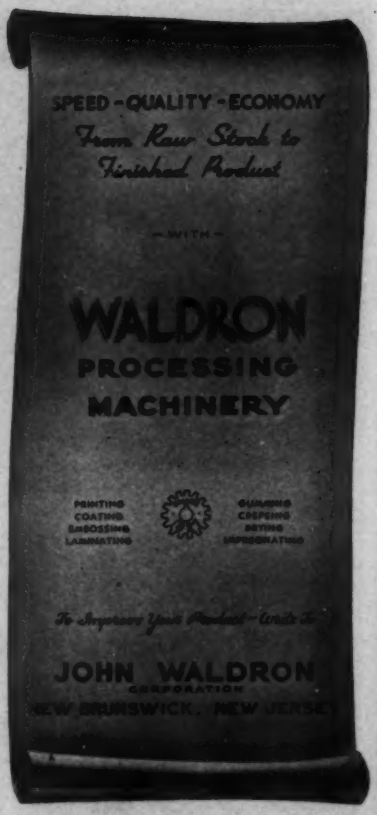
Clays as mined contain various amounts of exchangeable bases such as calcium, magnesium, sodium, iron, etc., which have an important effect upon the hydrating characteristics of the clay. The amount of these exchangeable ions is regulated by the species and the surface activity of the clay. Thus, by exchanging and regulating the amount and kind of exchangeable bases present in a clay, it should be possible to change its flow behavior to a certain extent. With this in mind, the three commercial coating clays were acid-washed to convert them to hydrogen clays—i.e., a clay which has had its exchangeable ions replaced by hydrogen ions.

In reviewing the effects of acid-washing upon the flow properties of these clays, it may be concluded that acid-washing has some effect upon the flow properties of Clays A and B and little effect upon Clay C. In any case, it was not possible to change the properties of the clays sufficiently to alter the characteristics of one clay to those of another.

An effort was made to change the hydrous properties of Clay B by a mild heat treatment (1½ hours at 250 C.).

The flow properties of heat-treated Clay B more nearly resembled those of Clay C but in no case was it possible to convert the flow properties of the former into those of Clay C. The nearest approach to accomplishing this was in heat treating the acid-washed clay.

Therefore, it is to be concluded that heating kaolinite clays to moderate temperatures results in a change in the flow properties of these clays which is believed to be caused by an irreversible dehydration and an agglomeration of the clay particles.



The previous work has shown that it has been impossible to sufficiently change the properties of Clays A-C by acid-washing or heating to make the flow properties of one clay like those of another. Likewise, the results indicated that particle size was quite important. To prove this, three fractions of the same clay crude (Clays D-F) were obtained, differing from Clay B (which was also obtained from this same clay crude) only in particle size. Thus, four fractions of the same clay crude were available for study. X-ray data showed these clays to be the same species—namely, kaolinite.

A striking similarity exists between the type of flow properties of Clays F and A.

The flow properties of Clay E closely resemble those of Clay C, even though Clay E is somewhat finer in particle size than Clay C. Clay D has nearly the same flow properties as Clay E, although it is considerably finer in particle size than Clay E or C.

It can be concluded that particle size is quite important in determining the flow properties of concentrated clay suspensions when enough dispersing agent has been added to give minimum viscosity. This, of course, assumes that the clay is composed of a single clay species. This work shows that, for commercial coating clays of coarser particle size, weakly dilatant properties exist in concentrated suspensions. Likewise, in these concentrated suspensions, as high a solids content cannot be realized as in the case of clays having smaller particle size. Below a certain size, the flow properties are not affected to any extent by a change in particle size.

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Methods of Reducing Chlorine Consumption

T. W. TOOVEY
Pennsylvania Salt Manufacturing Co.

The war has resulted in a drastic reduction of the amount of chlorine available to the pulp, paper, and paperboard industry. The industry in meeting this reduction, has had to set up new standards and methods of bleaching. In response to the request of the Pulp Purification Committee of the Technical Association of the Pulp and Paper Industry, many TAPPI members have sent in the results of their investigations. These results have been compiled for the benefit of the industry.

The preparation of the pulp prior to bleaching is naturally the first thought in obtaining chlorine economies. Unfortunately no information has been offered either by the sulphate or soda pulp mills as to whether steps have been taken to lower the bleach requirements of their pulps. Reports from the sulphite pulp mills indicate that this has been investigated and carried out. By altering the cooking procedure a reduction of the chlorine requirement from 5.5 to 4.5 per cent has been effected in one case.

In another, it was found that with a combination of a softer cooked pulp and an arbitrary reduction in the amount of hypochlorite in the second stage, a decrease of about 23 per cent in chlorine consumption with a drop in brightness of only two to four points was obtained. Where changes in acid concentration are possible, it has been found that by using a stronger acid and increasing the steam flow during the first three hours of cooking, a lowering of the chlorine requirement has been accomplished without lengthening the cooking time or raising the temperature. By using such a procedure the yield of pulp per cubic foot of digester space and the strength of the finished pulp have not been decreased.

Chlorine is used mainly in two forms: (1) chlorine as the element in a gaseous form and (2) chlorine in the form of hypochlorite. As the hypochlorite is generally manufactured as a separate process before being used, it might be as well to consider this first, with the view to possible economies.

The temperature and rate of chlorination are perhaps two of the most important factors in efficient bleach manufacture. 30 C. (86 Fahr.) is generally considered to be about the maximum desirable temperature for chlorination without the formation of excess chlorides. There seems to be a rather critical point of decomposition at 40 C. (104 Fahr.)

It is advisable to use a slow rate of chlorination at the beginning and at the end when the lime is nearly used up in order to obtain good control.

There is also a tendency at times during the chlorination of the lime slurry to add the chlorine too fast; although this would not be detected by free chlorine in the air it can be at the same time so rapid that much of the chlorine goes into chlorides. With efficient agitation and circulation, temperature gives a pretty good control on the permissible rate of adding chlorine, and with this efficient circulation or agitation it is believed that very few chlorides will be formed.

The stability of the bleach liquor is dependent on the *p*H of the liquor. The bleach liquor must be kept at a *p*H greater than 11.2 for complete stability. The bleach liquor which has been allowed to drop to a *p*H lower than this may be restabilized by the prompt addition of hydroxide of lime; however, such restabilized liquor should be used as soon as possible.

The washing of sludges after the settling and decantation of the clear liquor should be carried out for maximum efficiency. The number of washes used will depend on the apparatus available and the settling qualities of the lime used.

Generally speaking, it must be conceded that the more stages of bleaching that are used for obtaining a given brightness the greater is the chlorine saving. Even for as low a brightness as 74, a four-stage system is used in sulphite bleaching. This consists of chlorination, caustic soda neutralizing, high-density hypochlorite and low-density hypochlorite bleaching. The effect of lowering the brightness required has been to alter the balance of these various stages. The greater the percentage of the total chlorine requirement used in the chlorination stage, the greater is the saving in chlorine. However, in order that the dirt count of the pulp does not become too high, a certain limit must be set on the

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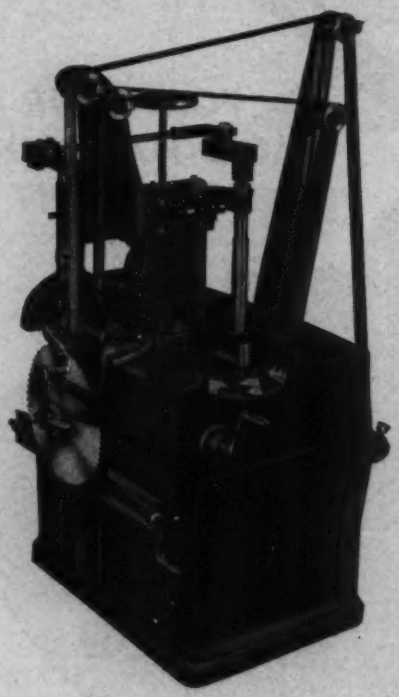

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amount of chlorine used in the chlorination stage in order that a sufficient amount of chlorine as hypochlorite can be used to bleach out the shives, bark, etc., present in the unbleached pulp.

In bleaching soda pulp it has been found that as the chlorine is reduced, better results are obtained by using a higher percentage of the total chlorine in the last stage. This amount should be enough so that the bleaching continues for about four hours. Lower temperature in the final hypochlorite stage seems to help also because it prolongs the hypochlorite bleaching time. For soda pulp, to obtain the best results from the reduced chlorine consumption, the following points have been suggested.

The pH should be maintained at about 9 in the hypochlorite stage.

Lower temperatures in the last stage always and in the first stage in cases where the chlorine reduction is beyond 20 to 30 per cent are beneficial. In any case the temperature should not exceed 100 Fahr.

Reduce the chlorine in the first stage up to a 30 per cent cut and use a simple two-stage hypochlorite where the cut is more than 30 per cent.

Summarizing the effects of reducing the chlorine usage for sulphite pulp the following points are brought out:

1) With a chlorine usage of less than 80 per cent of the theoretical requirement, any reduction should be made in the chlorination stage if the optimum brightness is to be obtained.

2) With a chlorine usage of 70 per cent of the theoretical requirement, pulps can be bleached to about an 80 brightness; with 60 per cent of the theoretical chlorine, a brightness of greater than 70 can be obtained and with 50 per cent of the theoretical chlorine requirement, the brightness will be only slightly above that of the unbleached pulp.

3) Pulps bleached with a total of less than 50 per cent of the theoretical chlorine requirement will have a color lower than the unbleached pulp. Such pulps should be made only if the color is less a consideration than factors such as unbleached odor. If such pulps are made, the brightness will be obtained either with single-stage hypochlorite bleaching or two-stage bleaching using less than 20 per cent of the total chlorine in the chlorination stage.

4) Brightness values greater than that of the unbleached pulp can be obtained by using mixtures of fully bleached and unbleached pulps. Such a practice allows a brightness greater than that of the unbleached pulp to be obtained with an overall chlorine usage of less than 50 per cent of the theoretical chlorine requirement.

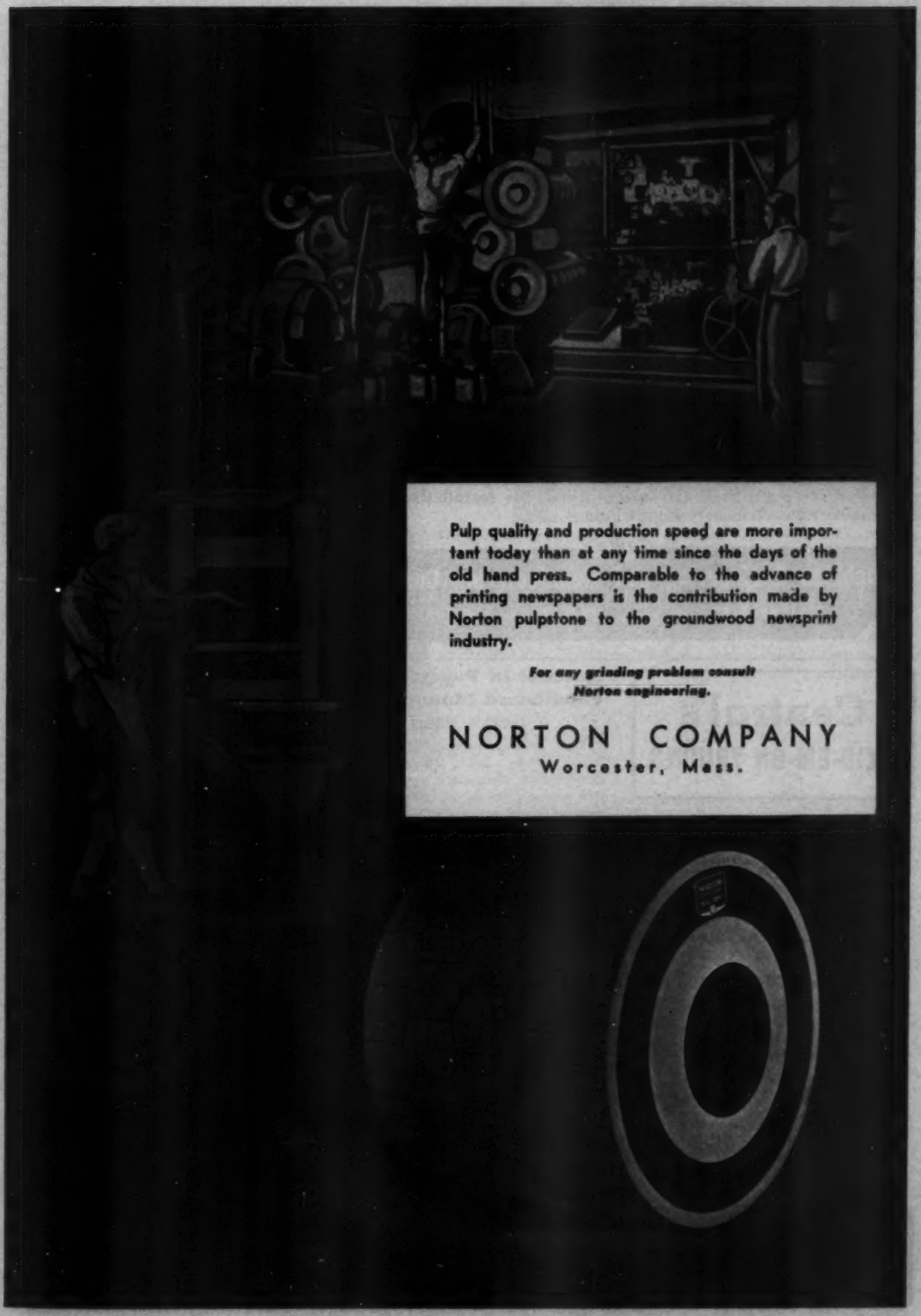
5) The cleanliness of pulps bleached with 80 per cent of the theoretical chlorine was good; between 50 and 70 per cent it was poor to fair; and below 50 per cent it was no better than that of the unbleached pulp.

6) The cleanliness of the mixtures of unbleached and bleached pulps was poor in all cases. For a comparable brightness, mixtures were much higher in dirt content than were entirely bleached pulps.

In a mill using as main fiber constituents for their book paper, the following materials: soda pulp, sulphite, and deinked old papers and ledger, an investigation indicated that the most efficient way to use the chlorine is to use as little as possible on the sulphite and the remainder on old paper and soda pulps.

Under the conditions which exist today, a large number of mills in using duller pulps have learned a great deal about the advantages to be gained from the blending of pulps in producing given colored shades. For example: many brown shades and gray shades have been made in the past on essentially one furnish, such as semi-bleached kraft. Today these same shades are being made with a mixture of semi-bleached and unbleached kraft where the dull component necessary to produce a gray or brown shade comes from the duller pulp rather than from the use of a dull or black dyestuff.

Acknowledgment—In presenting this information the Committee wishes to thank all those companies and individuals who have so generously co-operated in making this information available. It is obvious that these conditions imposed on the industry entail sacrifices of quality and a lowering of standards which will last only so long as the present emergency exists. In order that the industry can do its part in the War Production Program, the Committee hopes that others who have successfully solved the problem of chlorine reduction will offer their information for the benefit of the industry as a whole.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Starches in Paper and Paperboard Manufacture

JAMES P. CASEY[1]

There are three principal groups of corn starch on the market today. These are native starch, chemically modified starch, and mixtures of starch (either native or modified) with other chemicals. Of the three groups, chemically modified starches are of most importance to the papermaker and include the following types of modification: (1) oxidized starch (chlorinated starch), (2) thin boiling starch (acid hydrolyzed), (3) dextrin (acid roasted), (4) enzyme converted starch, (5) special converted starch.

Native starch is made in either the pearl or powdered form and is marketed under the name of either pearl starch or powdered starch. Most paper mills find it unnecessary to use powdered starch, although there are a few mills that prefer a powdered starch when adding dry starch at the beater. Pearl starch (which will mean native starch throughout this paper), is starch that has not been modified by strong chemicals, and since the molecular structure has not been disturbed, pearl starch will form a solution or paste of high viscosity when cooked. Since native starch is the base from which all modified starches are made it sells for the lowest price, but pearl starch has certain limitations, and for most users in the paper mill it is necessary to use a modified starch for best results.

Thin boiling starches are modified starches made by treating native starch with acid while suspended in water. They are similar to pearl starch in properties and form opaque pastes when heated in water. These starches are made in many viscosities which can be regulated at the starch plant by the time of treatment. This type of starch is sometimes used in the paper industry, although it finds its greatest use in the textile industry.

Dextrins are roasted starches. They are generally made by mixing acid intimately with native starch and roasting in converters at elevated temperatures until the starch has been converted to the desired degree. Dextrins usually contain a high percentage of highly degraded starch that is soluble in cold water, together with starch which has been barely acted upon at all. This water-soluble portion can be removed in the other types of conversion where water is used, but it is impossible to remove it in the dextrinizing process. This feature makes dextrinized starches unsuitable for many types of work.

Oxidized starches are modified starches made by treating starch with hypochlorite in water suspension. This type of starch is frequently referred to as chlorinated starch or starch gum. Oxidized starches are most unlike native starch in properties and produce cooked solutions that are transparent when hot and have little tendency to congeal on cooling. This type of starch forms better films than other types of modified starch and has unusual colloidal properties which give results that no other type of starch now known can produce. Oxidized starches are more costly to manufacture than other types of modified starches and consequently sell for a higher price, but for many uses in the paper mill this is more than offset by the effectiveness of this type of starch. Faced with high pulp costs and, in some cases, inferior pulp, cost of starch becomes secondary today and it is desirable to use the most effective starch obtainable, which, in many cases, is an oxidized starch.

Enzyme-converted starches are always converted in the paper mill as it is necessary to partially swell the starch granules before the conversion will proceed at a rapid rate. Native starch is used for the conversion, but there have been improvements made in corn starch within the past year to increase its effectiveness in enzyme conversion. To obtain solutions of the same viscosity from day to day it is necessary to maintain the same condition of pH, conversion time, temperature, concentration, per cent enzyme, etc.

Enzyme-converted starches are frequently used for making tub- and calender-sizing starches suitable for many grades of paper. There are certain applications for which enzyme-converted starches are not suited, and it is for these applications that it is wise to buy a modified starch.

Most paperboard mills use a starch solution in one of their waterboxes on the calender stacks. Calender sizing is almost purely a surface addition and it is generally used to improve the surface of the paperboard and lay the fuzz on the sheet, although in some cases where a highly modified starch of low viscosity is used, there

(1) Paper Chemist in the Sales Service and Development Laboratories, A. E. Staley Manufacturing Company.

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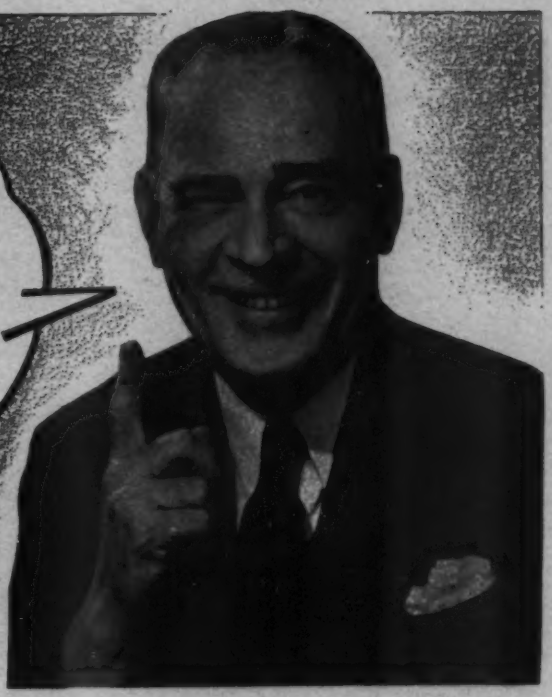

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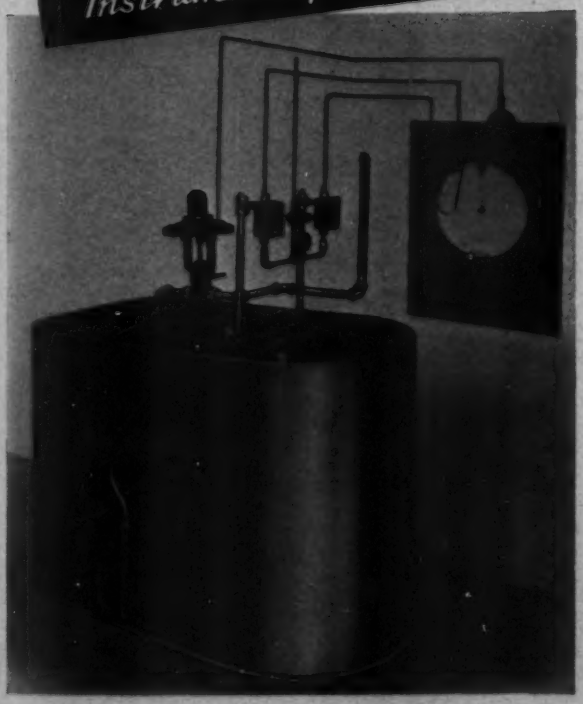

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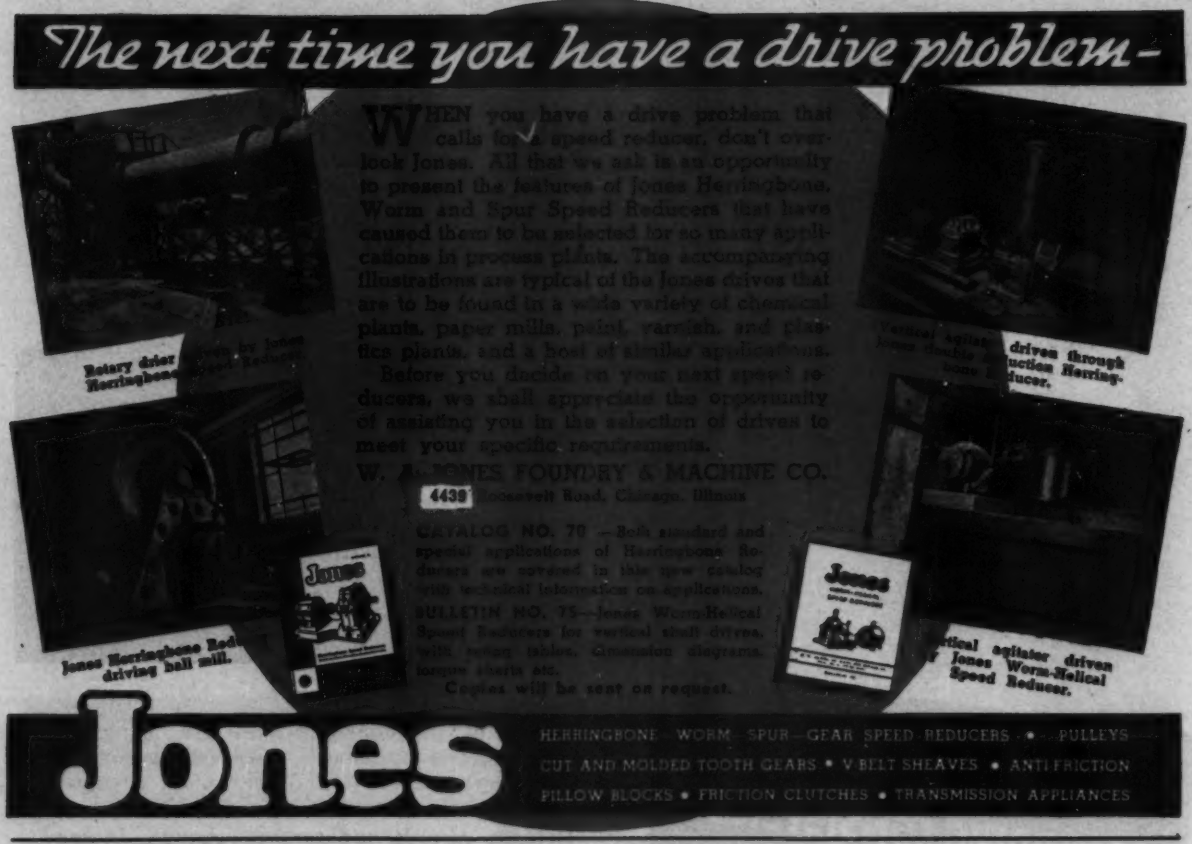
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is enough penetration to result in improved bursting strength. Calender starches are generally modified starches offered by the starch manufacturers, although for some uses paperboard mills have used pearl (native) starch with good results. The choice of a suitable starch depends on the results to be achieved and it is generally determined by the amount of starch to be applied to the sheet. Starches made by a slight modification of the thin-boiling process are generally used for this operation, although other types of starch are frequently used. Oxidized starches are considered too expensive for the usual application, although in cases where flexibility of the film is of importance they are often used. Highly modified starches that can be applied at high concentrations are used where it is desirable to add a heavy starch film to board, such as that to be used for gloss ink printing.

Slightly modified starches of high viscosity, or even pearl (native) starch, are sometimes used on the calenders when only a light application of starch is desired and little penetration is required. A slightly modified starch or pearl starch will produce a surface more resistant to scuffing and rubbing than that produced by a highly modified starch. For this reason many mills making heavy papers for shipping containers find it desirable to use the high viscosity starches.

Many paper mills use wax emulsions and other compounds with their calender starch to obtain special finishes or other special effects.

Many grades of paper are run through a size tub or size press in the dryer section. Tub sizing is considered to be a surface application, although there must always be some penetration. The amount of penetration depends on the temperature of the solution, the pressure used on the size press, the concentration of the solution, and the viscosity and type of starch used. The temperature generally used is between 125 and 140 Fahr. and the concentration varies from 0.5 to 4.0 Baumé or higher.

Highly modified starches of low viscosity are used at high concentrations when it is desirable to get a lot of starch on the surface and into the sheet. With these highly modified starches it is possible to obtain enough penetration to build up the burst and other physical tests. An oxidized (chlorinated) starch of low viscosity will help to build up the internal sizing of a sheet. Slightly modified starches of medium viscosity are frequently used where it is desirable to keep the starch on the surface. These starches are used where it is desirable to improve the writing surface and increase the erasibility.

Oxidized starches (chlorinated) are most suitable for this type of sizing, although other types of modified starches are used on certain grades of paper with excellent results. Oxidized starches are almost exclusively used on blueprint and other high-rag content papers, but many mills making lower priced writing and ledger paper find oxidized starches to be the most satisfactory product from every standpoint. These starches result in better ink resistance, better surface, and generally in higher test than any other type of modified starch, particularly on the better grades of paper. However, enzyme-converted starches and special thin boiling starches are very commonly used for tub sizing, particularly on the cheaper grades of paper.

Beater sizing is the easiest method of applying starch. The addition of starch at the beaters generally results in higher burst, higher fold, higher tensile, less surface fuzz, higher wax pick test, and, with some starches, better sizing. Starch can be added at the beaters either cooked or uncooked, depending on the starch used and the results desired. All types of starch from pearl to special modified starches are used in the beaters, depending on the results to be achieved. Pearl starch is the cheapest starch and it is used where low cost is necessary and where high stiffness is desirable. Oxidized starches are quite expensive, but they have many special properties which make them desirable, and, for example, they will act as a protective colloid on the rosin size and insure better distribution.

So far little has been said about the viscosity of a given starch for beater sizing. It has been shown that the viscosity of a starch is important in calender and tub sizing, but beater sizing is an entirely different type of application. In all other applications of starch the viscosity of the starch used determines the amount of starch that can be added to the paper and this is often the principal factor in deciding on a starch of a certain viscosity. This is not the case in beater sizing, as the viscosity

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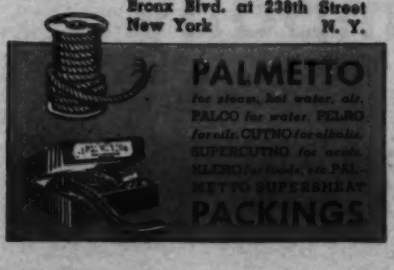


of the starch has no bearing on the amount that can be added to the beaters (although it does have an effect on the size of the cooking tanks). For this reason, the importance of viscosity in a beater starch has often been overlooked. However, laboratory and mill results show that viscosity is important in beater sizing.

Within the past few years tremendous quantities of starch have been used for coating paper. Most of this tonnage has been used for making machine-coated paper, but some of this starch has been used on regular brush coaters. They have proved that starch can be used to replace casein in most coatings. However, starch is an entirely different type of adhesive than casein and a knowledge of its possibilities and limitations is necessary before a satisfactory change can be made.

Oxidized starch is the type of starch that has proved most successful for coating paper. The high degree of dispersibility of this type of modified starch gives colloidal properties that are of value in preparing starch coatings.

There is considerable difference in the characteristics of modified starches when it comes to using them in coating formulas and, of all the different types of modified starches, the oxidized starches have proved superior. This is true in regard to characteristics of the finished coating as well as flowing properties of the coating mix. The unique colloidal properties of oxidized starches make for better dispersion and adsorption with the coating pigment, resulting in more stable coating mixes and coatings of more uniform composition. This produces a coating mix of good flow characteristics and one that will hold its water until the brushes have smoothed the coating, and, other things being equal, the final coating will have the maximum wax pick test and be free from dusting.

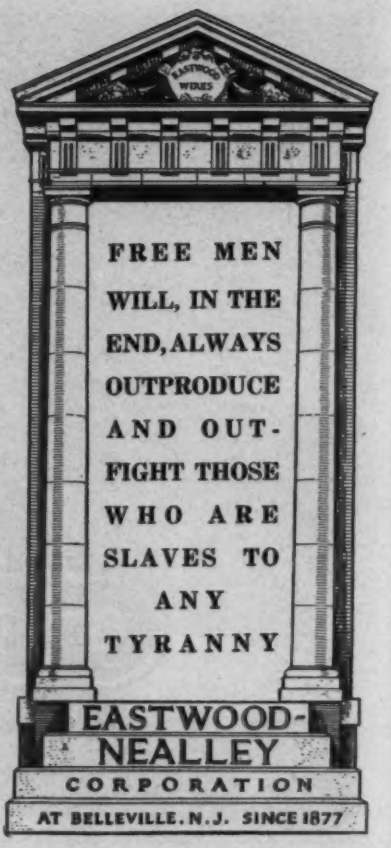
For machine coating, highly converted starches of low viscosity are used, because it is necessary to keep the water content as low as possible to obtain rapid drying, and starches of low viscosity are generally used although the use of a high-viscosity starch is not uncommon.

The coating weight, pH of the coating mix, type of pigment, type of rawstock, and other factors affect the results obtained with any adhesive, but the effects of these factors are outside the compass of this paper. The type of rawstock has considerable effect on the operation of a coating color, as well as the results obtained in the finished coating, but probably the biggest factor in the characteristics of any coating is the type and characteristics of the pigment used.

Considerable quantities of starch are used as adhesives for corrugated board and solid fiber combining. This is a specialized use of starch, and since a thorough discussion of this process would take considerable space, it cannot be discussed in this paper.

The commercial adhesives used for combining solid fiber paperboard and pasting sheet-lined paperboard are made with dextrinized starches.

Oxidized starch does not make satisfactory adhesives and it is never used for this purpose. Highly converted thin boiling starch will make fairly good adhesives, although in general they do not have as much tack as adhesives made with dextrinized starch, but recent tests have proved that starches made by a special thin boiling process will make excellent adhesives and have the advantage of greater uniformity than dextrins. However, dextrins remain the most widely used type of starch for the manufacture of commercial adhesives.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Radiant Heat and Its Application

JAMES D. HALL[1]

It must be recognized that radiant heat does not invalidate any of the well known laws relating to energy requirements such as, for instance, that law which tells us 970 B.t.u.'s are required for evaporating one pound of water of 212 Fahr. or that each kilowatt hour is equivalent to 3413 B.t.u.'s. Knowing this, the question then arises as to why radiant heat is receiving so much attention and is being applied to so many industrial heating jobs. Some of the reasons may be summarized briefly as follows: speed, low equipment, installation and maintenance costs, ease of control, flexibility, reduced space requirements, safety and cleanliness.

We refer to the laws of heat transfer to find the secret of the speed of infrared or radiant energy. In effect these laws state that in the transfer of heat from one medium or object to another, the rate of transfer is relatively high when the tem-

(1) Commercial Engineer, Lamp Division, Westinghouse Electric and Manufacturing Co.

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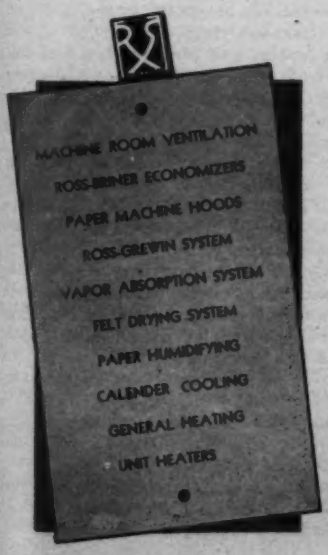

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1. Is it easy to operate and economical to maintain?
2. Will the rolls produced on the winder be perfectly wound, straight on the ends, and free from slitter cracks at the edges?
3. Will the rolls stand the bumps and jolts of shipping and handling?
4. Will a carload of these rolls contain more actual weight of paper per car and so save on freight weight?
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6. Will the paper on these rolls unwind smoothly, and at high speed, clean to the core?

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CAMACHINE

perature differential between the two is relatively great. This rate of energy transfer falls off rapidly as the temperature of the object being heated approaches that of the source of heat.

Radiant heat is transmitted direct from its source to the surface or object being heated. There is no dependence upon the surrounding air as a medium of transfer, hence expensive insulated ovens are not required. Maintenance of a radiant heat installation consists principally of infrequent replacement of broken or burnt-out lamps and reflectors. The savings in material, installation and maintenance costs are obvious.

A radiant heat installation may be wired to any desired degree of flexibility of control. Where material of varying widths to be heated passes under a bank of lamps, rows of lamps along the length of the bank may be turned off or on so that the width of the bank conforms with that of the material. Likewise when materials of varying thickness, moisture content, or color are to be dried or heated, the desired variation in energy required may be obtained by varying the voltage applied to the lamps or simply by turning on or off lamps in rows perpendicular to the direction of travel of the material.

Due to the possibility of application of a greater amount of energy per unit with radiant heat, it usually occupies less space than conventional heating and drying equipment required for the same process. Being of relatively light weight, drying lamps and their auxiliary equipment may be suspended from and mounted near to the ceiling, thereby conserving the floor space below for other purposes.

The safety and cleanliness of a radiant heat installation compare favorably with those of a lighting system. Investigation and tests ("No Explosion From Infrared," *Electrical Contracting*, Page 28, 1941). "Power Sales Manual," (Section IV Infrared Heating, Page 24, 1941) indicate that the danger of fire or explosion from drying lamps is negligible even under the most adverse conditions.

The primary function of the drying lamp being to produce heat, with light as a by-product, economy from the standpoint of light production is not a factor; the desire being rather to produce an efficient radiant heat generator having a relatively long life.

The demand for drying lamps is confined largely to lamps of three wattages, namely 250, 500, and 1000, all rated at 115-120 volts. The lower wattage lamps employ the usual medium screw base. There are two general types; one, and incidentally the most popular, incorporates the use of a self-contained sealed-in reflector. The other type is designed for use with separate reflectors usually of Alzak aluminum or gold-plated metal. The 500- and 1000-watt medium bipost base lamps are designed for use with separate reflectors. Some of these reflectors are of the open type while others are totally enclosed using a cover plate of light-absorbing infrared-transmitting glass to protect the reflector from an accumulation of dirt and dust and to reduce annoying direct or reflected glare.

For most satisfactory performance drying lamps always should be protected from vibration or shock from conveyors or other moving machinery. Where portable drying lamp stands are used, rubber-wheel casters should be provided. The lamps preferably should be turned off while the stands are being moved.

Drying lamps require no special transformer equipment and may be operated direct on a regular 120-volt lighting or power circuit. Where it is desired to use a 220-260-volt circuit, the lamps may be connected two-in-series. Sockets for 500- and 1000-watt lamps should be of the same type as used for medium bipost base general lighting service lamps. Any good grade of porcelain shell medium screw socket may be used with the lower wattage lamps.

It is of importance to know that a surface efficient in the reflection of visible light is not necessarily as efficient for radiant heat. For example, the porcelain enamel finish widely used for lighting equipment is an inefficient infrared reflector. As previously indicated, Alzak aluminum and gold-plated metals rank high in the reflection of radiant heat. "Sputtered" aluminum used for the reflector surface in reflector type lamps and in some types of totally enclosed reflectors also is highly efficient for this purpose. No type of paint, including aluminum, is an efficient radiant heat reflector.

Where previous experience is not available as a guide for the selection and installation of radiant heat equipment to be

used for a specific drying or heating purpose, the required information preferably should be obtained from actual tests. The initial tests may be conducted by the prospective user and may be of small scale followed by expansion if results appear to be promising. Laboratories for experimental work are provided by some of the radiant heat equipment manufacturers and the public utilities. However, in many heating or drying problems, supervision of experimental tests under actual production conditions by individuals having expert knowledge of the results to be accomplished is desirable. In others, the process may be of a secret nature. In such cases, the prospective user may prefer to have the experiments conducted on his own premises. For use in such experimental work certain elemental facts concerning radiant heat and radiant heat equipment and its application are useful.

The degree of uniformity of radiation required varies with the application. The maximum degree of uniformity necessary would be found, for example, in the radiant heat drying of a finish applied to the surface of some nonconducting material such as wood, while a much lesser degree of uniformity would be necessary in the application of energy to a steel sheet where conduction of the heat in the metal from the higher to the lower temperature areas would largely prevent excessive temperature differentials.

Drying lamps may be operated in any position, that is, base up, base down, base horizontal, etc. This means that the cross section of a radiant heat "tunnel" may be of any shape desired to conform with the contour of the object being dried or heated and that radiant energy may be applied to the top, bottom, or sides of any object.

The wattage and spacing of radiant heat lamps and reflectors naturally vary with requirements. Lower concentrations of radiant energy may be obtained with relatively wide spacing of 250-watt reflector lamps or 250-watt lamps with separate reflectors as compared with maximum concentrations from closely spaced 250-watt reflector lamps or closely spaced reflectors using 500- or 1000-watt lamps.

Inasmuch as heating of the air is not involved in the transfer of energy by radiation, insulated enclosures are not required; in fact, many installations use no enclosures whatever. However, protection of material being dried or heated from excessive draft will increase the efficiency of the installation.

If the two surfaces of a material to be dried are of different colors, it is desirable to apply radiant heat to the darker surface because of its greater absorption. For example, if a sheet of dark metal having a white finish applied to one of its surfaces is to be dried, it is more economical to apply the radiant heat to the unpainted side.

Total enclosure of unventilated radiant heat equipment always should be avoided. This is necessary from the standpoint of dispersal of moisture of volatiles and to assure satisfactory performance of the lamps themselves.

The switching arrangements for a drying lamp installation of course may be made

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Wherever Morris ST-P Stock Pumps are installed, pulp and paper mill superintendents and operators report completely satisfactory service.

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Here's what happened in a southern mill making wrapping paper and board:

This mill wanted to refine all pulp mill rejects and include them in the board furnish. Jordaning was out since the stock produced was too slow, resulting in loss of production.

The Bauer double-disc pulper, however, did the job with two important results: 1) the screen rejects were fiberized with freeness high enough to maintain high machine speed. 2) the product was better both in appearance and quality due to elimination of practically all large shives and flour.

Can Bauer pulpers help you on your furnishes? Find out by writing for details.

The BAUER BROS. CO.
SPRINGFIELD OHIO

as flexible as desired. In general, they may follow the pattern of a lighting system of comparable load.

It should be recognized that radiant heat is not a cure-all nor is it best suited and the most economical for all heating and drying purposes. The nature and condition of the material to be heated, the relative cost of the various types of energy (steam, gas, electricity, etc.) available, space requirements, quality of results produced, etc., are some of the factors influencing the choice of method.

Despite the fact that radiant heat has worked apparent miracles in many heating and drying problems, it should not be expected to accomplish the impossible. It is a new tool of industry which has proved to be a new answer to many old unsolved questions in the field of heat transfer. If new equipment is being considered, or additions to existing equipment are contemplated, radiant heat is worthy of investigation.

Paper Characteristics Versus Ink Coverage

GEORGE CRAMER, Director of Research Sinclair and Valentine Co.

The need for a fairly accurate table of ink coverage for lithographic estimating could not be realized without the instigation of considerable research. Strangely enough in this study, it was discovered that many factors previously overlooked have a vital bearing on the results obtained. Naturally it was to be expected that surface smoothness of the stock would determine ink coverage; and a large series of scientifically conducted tests confirms this assumption. The tests mentioned above were run on a number of different litho-coated stocks and on several offset stocks—all of these stocks being from different mills and having different quality characteristics. The inks employed covered a complete range of colors and gravities and consisted of eighty-four items. Several hundred of each of the previously mentioned stocks were lithographed in all of the colors, after which each characteristic affecting ink mileage was studied. This investigation also took into account those ink characteristics such as specific gravity, color strength, opacity, and working properties all of which are vitally associated with ink coverage.

The paper characteristics that affect ink mileage are smoothness, absorbency, and receptivity. Each of these qualities can either add to or subtract from the expected coverage of a specific ink. While it is rather difficult to determine which of these paper factors creates the greatest speed, it can be said that according to the results as found in our investigation that either one of them can effect differences of plus or minus 25 per cent.

Mileage differences of from 25 to 65 per cent, due to paper surface smoothness, seem unusual; yet actual test runs indicate such a wide variation. In this connection, however, let us hasten to mention that some qualities of inks may tend to either add to or detract from paper smoothness, depending somewhat on opacity, density, or distribution.

Average figures obtained from a large number of press sheets indicate a 25 per cent increase in mileage for representative coated stocks.

Differences in stocks in respect to penetration sometimes make for larger ink mileage variations than do some of the other paper characteristics. In order to more thoroughly investigate this condition, a series of coated stocks were selected which showed penetration differences as indicated by the K & N system. Offset stocks were not considered for penetration differences inasmuch as these stocks do not indicate noticeable color variations as is the case with litho-coated stocks.

Where a specific job is being encountered, ink formulation changes can be made to overcome undue penetration factors; thus ink differences, must be also considered as having a bearing on the results.

Lack of ink receptivity gives the ink maker more difficulty than any of the other paper characteristics. This difficulty lies in two directions, both of which are quite bothersome. In the first place it is almost impossible to match the copy, thus creating a customer dissatisfaction. Secondly, if the ink is crowded on, an offset condition is created which even sprays will not help. The unusually hard surfaces of these stocks do not allow for any penetration whatsoever; consequently, bringing into being the results indicated above, plus mottling and, sometimes, even spottiness. Here, too, ink formulation changes can be made to assist, but in most instances even though greater

mileages are obtained from the inks being used, the general results produced are unsatisfactory, due to dull, lustreless reproduction. Invariably the inks are blamed for such work, the pressman claiming lack of color strength, but in most instances the lack of ink receptivity is the controlling factor.

It is now our intention to see just how certain ink factors determine the square inches of paper stock covered by a pound of ink. Continuing the procedure followed in the first half of this paper, we find that pigment strength, specific gravity, and color itself all have a distinct relationship to the results accomplished.

The strength of an ink does not always give results in proportion to its value. This is due to the fact that a certain amount of ink is required to cover a stock regardless. Strength comparisons frequently cover a wide range and it is not unusual to find some inks that will cover twice or three times as many square inches as others.

The specific gravity of an ink is a factor in the coverage obtained, but here again, both color strength and color hue should enter our consideration in evaluating the results.

Black, one might quite naturally think, is the strongest of the colors; this, however, is not the case. Even though black possesses great intensity, it cannot be compared on a bleach basis with purple toner. In this instance tests indicate that black has only half the tinting strength of the purple mentioned.

Considering the above data, we will now attempt to balance all of the factors involved and set up a workable chart that can be used in estimating ink consumption for offset lithography as shown in the accompanying table.

This table is figured on the basis of 100 per cent coverage, thus, if only 50 per cent or 25 per cent of the sheet is covered, the ink coverage is multiplied either by two or four, whichever the case may be. The same is true for three-quarter tones, half tones and quarter tones using the reciprocal of the tone involved—thus four thirds, two or four.

Color	Coated Stock sq. in./lb.	Offset Stock sq. in./lb.
YELLOW		
Toners	200,000	150,000
Chromes	100,000	75,000
ORANGE		
Toners	200,000	150,000
Chromes	120,000	90,000
RED		
Toners	225,000	175,000
Lakes	175,000	125,000
BLUE		
Toners	250,000	200,000
Lakes	200,000	150,000
PURPLE		
Toners	275,000	210,000
Lakes	200,000	150,000
GREEN		
Toners	225,000	175,000
Lakes	175,000	125,000
BLACK	185,000	135,000
SILVER	250,000	180,000

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295 Madison Avenue

New York, N. Y.

Nonfibrous Raw Materials in the Paper Industry Report, 1941

E. N. POOR, Technical Director
W. C. Hamilton & Sons

Domestic pulp, paper, and paperboard production established an all time record during 1941. The estimate of total production of all grades is over 17,000,000 tons, approximately 20 per cent over that in 1940.

The supply of salt cake (sodium sulphate) was adequate for the increase in sulphate pulp production. The use of substitute cake from soda ash and sulphur continued to expand.

The outlook for 1942 is that there will be sufficient available to meet any reasonable expansion of sulphate pulp production.

What chlorine will be available for the pulp and paper industry in 1942 cannot be foreseen. All that can be said with assurance is that the war production program and sanitation will be served first. What chlorine is left after those needs are filled will, in all probability, be allocated by the government.

There appears to be no substitute for chlorine as a bleaching agent for the pulp, paper, and paperboard industry.

We do not know of any substitutes which can be used in the paper industry for caustic soda. Of course, it would be possible partially to replace caustic by such compounds as silicates and phosphates but these are difficult to obtain.

Despite the fact that there is an increased demand for caustic, we do not believe that there will be much variation in the price and certainly the industry will not sacrifice their high standards of quality.

Since soda ash is the cheapest and most readily used form of alkali, it is difficult to find any satisfactory substitute for use in pulp, paper, and paperboard manufacture. It may be possible to substitute lime for some of the minor soda ash uses such as straw or rope cooking, but the increasing demand for lime in war production may affect this substitution.

In spite of demands on the sulphur industry during 1941 for the largest volume of shipments on record, over 3,300,000 long tons, both production and stocks will be able to meet any demands of the coming year.

Substitutes should not be required, nor do we know of any adequate substitute.

We think there is good reason for expecting that the industry's requirements of liquid sulphur dioxide can be furnished during the coming year.

The question of containers, of course, is an important one to be considered when compressed gases are involved. However, the indications are that a sufficient number will be available for normal requirements of the industry.

In addition to its use in connection with bleaching processes, and for the fortification of cooking acid, liquid sulphur dioxide is now being employed in certain cases to replace alum where this latter chemical has been used for *p*H control. We understand that alum is difficult to obtain at the present time, at least in certain areas, and the ability of liquid sulphur dioxide to replace this material is one of the inherent advantages.

Lime is an important raw material to our war program, and the lime manufacturer desires the co-operation of the consumers.

We suggest to all industrial plants who consume lime daily to keep their storage bins well stocked. All railroads are taxed very heavily with shipments, and railroad equipment suitable for the shipment of lime is not going to be plentiful. The deliveries of lime are not going to be as prompt as they were before the war program went into effect.

The production of alum in the United States has increased appreciably in the last two years. There has been an increased demand due to a considerable increase in paper production, and the extended drought resulted in an unusually large consumption of alum for water coagulation. The present demand is such that the alum production capacity is taxed to the limit and in some cases there is an appreciable quantity of back orders. The actual availability fluctuates in various localities but as a whole the situation is tight. This is not because of any curtailment of alum production, but because of the substantially increased demand.

Some of the possible substitutes for alum in the paper industry are:

a) Ferric sulphate which mill trials have demonstrated can be substituted for alum on some grades of paper for sizing as well as for water coagulation.

b) Sodium aluminate often may be substituted for part of the alum for sizing or water coagulation.

c) Sulphuric acid often may be substituted for a part of the alum.

d) Aluminum chloride, according to laboratory tests, will size paper in a manner similar to alum although it presents a corrosion problem.

Consumption of rosin in the form of rosin size reached a very high level in 1941, in line with the expanded level of paper and paperboard production. Fortunately, there has been, and still is, an abundant supply of rosin.

Prospective total supplies appear adequate, even though former excessive reserves are being liquidated much more successfully than was expected, and outside of possible transportation difficulties the only problem may be in obtaining certain specific grades of rosin, particularly the lower grades and the extremely high grades.

The extremely unsettled conditions which prevail at the present time prevent any confident forecast of the effect which the war may have upon supplies of sodium silicate. Raw materials were available in quantities sufficient to satisfy sodium silicate demands during the year 1941. The question of substitutes for silicate of soda thus far has not arisen.

No important new uses for silicate of soda in the paper mill have emerged during 1941. Of new importance is the present application of an earlier discovery. The shortage of chlorine for bleaching has aroused interest in a development of some years ago in which it was found that silicate of soda could be effectively used in the bleach to permit reduction in the chlorine requirement. A number of mills are currently investigating this use in order to adapt the development to their individual needs.

Casein continues to hold its number one position as an adhesive material in coated paper production.

During the past few months the mills have been substituting starch and soya bean protein for casein in the cheaper grades of coated paper due to the high price of the latter product. This type of substitution should go a long way in alleviating any shortage of casein for those grades of paper in which other types of adhesives are not suitable for one reason or another.

In a forecast for the next year, there should be ample starches for all domestic papermaking purposes, and we can see no particular indication at the present time of a shortage to occur. There are a few modified starches requiring certain chemicals in their manufacture on which the supply may be short over the next few months, but substitutes for those few starches in the modified class in which a shortage may occur will be available.

No entirely new uses have been developed for starch in the paper industry during the past year, and none are anticipated in the next few months. However, the papermaker has found that the increased

This Alloy *Successfully Resists the Corrosion of* "Sulfite" Pulping

A number of pulp mills using the sulfite process have found that frequent and costly replacement of metallic digester parts need not be tolerated.

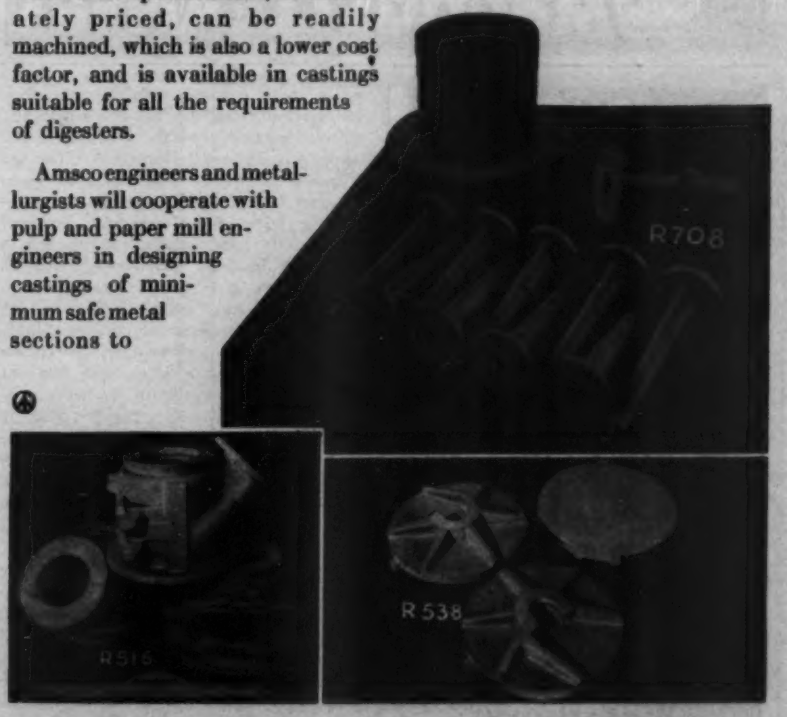
A special formula of Amsco Alloy, given the symbol F-12, a chromium-nickel alloy, has been worked out in Amsco's research laboratory that copes with the heat and corrosive conditions encountered in digesters.

An advantage is the ductility of this corrosion-resisting alloy which reduces the incidence of fracture from load carrying, compression or other stresses. F-12, the paper industry's own alloy, conforming with T.A.P.P.I. specifications, is moderately priced, can be readily machined, which is also a lower cost factor, and is available in castings suitable for all the requirements of digesters.

Amsco engineers and metallurgists will cooperate with pulp and paper mill engineers in designing castings of minimum safe metal sections to conserve metal, with required surfaces machined for accurate fit; and in designs that facilitate installation and efficient operation generally.

Some Amsco Alloy F-12 castings, typical of those made for sulfite process digesters, are shown: a bottom sleeve in the background, a side relief fitting at right and steam nozzles and ring in the foreground (R-708). Blow valve bodies (R-516) and valve discs (R-538).

Bulletin No. 108 outlines our research and 400,000 volt X-ray inspection, describes our foundry methods and pictures castings of Amsco Alloy for all industries. Send for a copy.



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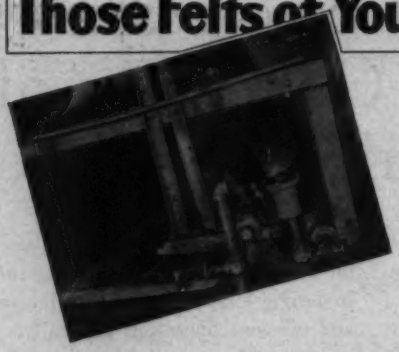

Wool's short—and though you can get felts because paper is an important product during war time, you should take extra care to get the longest possible service from your felts.

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will materially increase the life of your felts. They clean thoroughly and rinse out completely leaving a soft, absorbent felt with restored nap.

For keeping up production at top speed—try Magnus NX to wash and recondition your felts on the machine, without shutting down.

If you must wash felts off the machine, Magnus Feltex is a safe, dependable and highly economical cleaner which has been used for years to obtain really clean, thoroughly reconditioned felts.

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SKANEATELES FALLS NEW YORK

use of starch has been helpful in the present emergency and this has resulted in the use of increased amounts of starch in the beater, tub, and on the calenders. The use of starch adhesives has increased as manufacturers have found that starch will produce a fairly water resistant combined board. The paper coater has started to use starch in large quantities on regular brush coaters, and starch is being used in increasingly large quantities for making machine-coated papers. Development work has resulted in improvements in certain types of modified starches, and this has resulted in better results for the paper manufacturer.

The demand for glue is running greatly in excess of supply and as raw materials for making it are not available in unlimited quantities, it is impossible to increase production to satisfy the entire needs of the trade.

As far as substitutes for animal glue are concerned, paper manufacturers are familiar with the types that have been advocated for the different operations in which glue is used. A number of these substitutes are harder to obtain than glue. It is our feeling, shortages of other materials, entering into the manufacture of paper, will bring about an adjustment in the production of paper that will eliminate the necessity of obtaining substitutes for animal glue.

Because of the war program the availability of all titanium pigments in the coming year will be definitely limited. During the past few months suppliers of titanium pigments have found it nesessary to put their customers on an allotment basis.

There is no material approximating titanium pigments for producing opacity, whiteness, and brightness in paper. Even if such materials were possible their availability would be limited also.

New uses for titanium pigments in the paper and paperboard industry especially during the last half of the year were greatly curtailed by the fact that only a limited supply was available and that this supply barely sufficed for old uses. The use of pigments for coating was greatly extended, especially in the field of coated opaque waxing stock.

The war will have a definite effect upon the availability of zinc sulphide pigments during 1942, inasmuch as great quantities of them are required in numerous products. Due to the demand, it is impossible to say at this time what tonnage of zinc sulphide pigment will be used in paper products.

A substantial tonnage of clay was imported from England during 1941, to supply United States and Canadian needs. The outlook for the coming year is favorable.

Domestic clays continue to increase in consumption.

The war effort plus civilian requirements has caused an unprecedented demand for dyes during the past year.

The extraordinary demand, difficulties in obtaining new equipment and replacements, the shortage of certain raw materials and chemicals, some of which have come under government priorities, have created an exceedingly difficult production problem for the manufacturer.

While the future is entirely dependent on the war program, the dyestuff consuming industries are of such importance to the national well-being that it is believed everything possible will be done to insure adequate supplies for the dyestuff industry. Deliveries of dyes to the paper industry have so far been approximately 45 per cent greater this year than in 1940, and we believe this increase is general throughout the industry. All of this large production has not gone into consumption, as it appears that mills which heretofore have carried little or no inventory have shown an inclination to build up stocks to last several months. Part of the increased consumption has been due to the chlorine situation, larger quantities being used to counteract the dull furnishes.

If shortages occur in certain dyes, substitutions will have to be made with those available but each case will be a problem in itself and will have to be solved as the situation arises.

The W. P. B. order directs all glycerine producers and dealers to restrict deliveries to direct war requirements, to medical and pharmaceutical uses, and to nonwar, civilian industries only when lack of glycerine would force a plant shutdown. Sworn statements of actual need must be made by purchasers in all cases. The intention is obviously to concentrate glycerine stocks in the hands of producers rather than consumers. It is believed that this action will greatly clarify the situation and should make it easier for a bona fide purchaser to secure delivery.

At the present time producers are having no difficulty in filling orders for corn syrup

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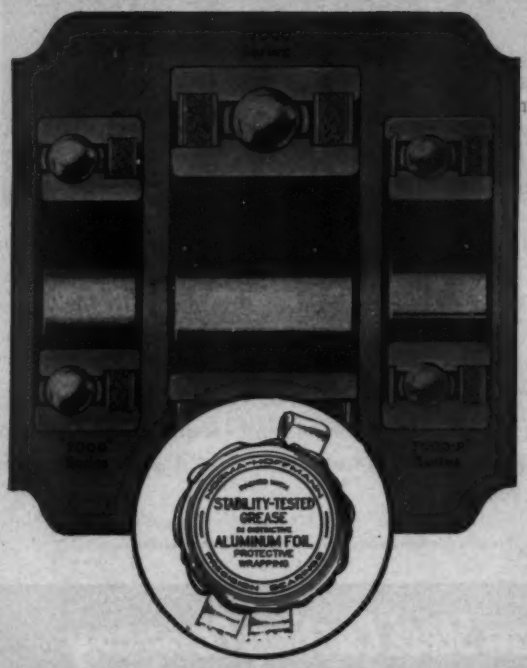

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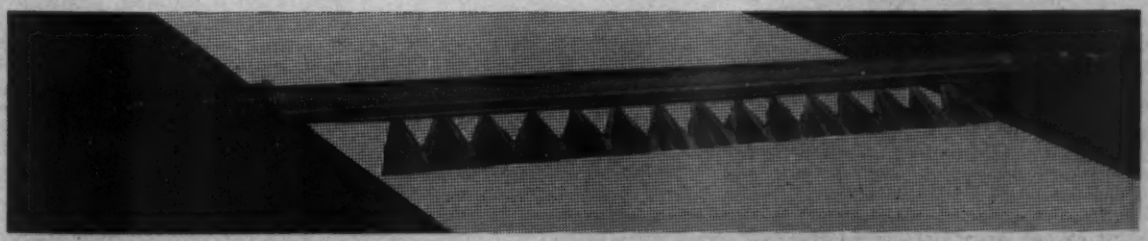

BULLETIN 134

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The paper industry has, during the past year, continued to use a limited but increasing amount of different synthetic resins as sizes in the manufacturing field and as coating in the converting field. Of the resins, the urea formaldehyde and alkyd types are probably most widely used. In both types, the shortage in phthalic anhydride and formaldehyde have restricted the amounts of resin available for civilian application.

Synthetic resins have already proved a useful tool to the paper manufacturer. Development work now in progress in many mills will increase their scope of application which has been limited heretofore to more or less specialized uses.

Use of enzymes for starch conversion during 1941 continued to expand. Diastatic enzymes in the paper industry are utilized for tub and calender sizing, for coating, and for laminating. The coating field is using more and more starch for pigment binding and much emphasis is being placed on the conversion of the starch with enzymes. The chlorine shortage has resulted in the substitution of much enzyme-converted starch for the chlorinated starches. Corn starch is now the major one being converted. There was no shortage of enzymes and none is anticipated because their manufacture is entirely domestic and few critical raw materials are needed in their manufacture. Several new enzymes appeared during the year, offering greater economy and efficiency, particularly for corn starch conversion.

During the past year the consumption of dispersed petroleum waxes by the paper and paperboard industry has continued to increase, although no actual figures on total consumption or increase are available.

No completely new developments in this field have been brought forth in 1941, but suppliers have been constantly working on modifications looking toward improvement of stability, convenience of handling, economy of use and effectiveness.

One type of product that has received considerable attention is the nonaqueous solid wax composition that may be emulsified in water at the paper mill without the addition of other chemicals. The economy of shipping a water-free product has long been recognized and further development along this line may be expected in the future. Increased quantities of such compounds are already in use for both surface and beater sizing.

The use of wax size in the beater to secure resistance to lactic acid has been better worked out and new knowledge has been acquired concerning the effect of wax sizes on moulding and shaping of paper articles and on the drying of the paper on the paper machine.

In the field of surface sizing benefits have been derived in some cases from the substitution of calender applications of wax emulsions for dry waxing subsequent to paper manufacture. So far no priority restrictions have been placed on petroleum waxes.

Foam killer, pitch dispersion materials, general emulsifiers, and other production aids, increased substantially.

Two-Sidedness of Colored Paper*

OTTO KRESS[1] and EDWIN J. LOUTZENHEISER, JR.[2]

Certain dyes seem to have much more of a tendency to produce two-sidedness than do others. Some have a special affinity for certain types of stock, fillers, sizing agents, and the like. Certain dyes bleed from the dyed fibers more easily than others, and some burn to the surface of the dyed sheet on drying. Direct, or substantive, dyestuffs are among those which show the least tendency for two-sidedness (TAPPI, Special Report 74. New York, TAPPI, 1937. 15 p.) Roberts has discussed many reasons for this behavior (Roberts, J. R., *Paper Mill* 57. No. 4:4, 10, Jan. 27, 1934; Roberts, J. R., *Paper Trade J.* 81. No. 14:53-56, Oct. 1, 1925).

Beater conditions have been blamed for much of the two-sidedness in paper. The stock furnish is important, particularly if several different kinds of stock are used. The order of addition of the furnish to the beater, circulation, temperature, and *p*H in the beater are important. The hydration and freeness of the stock is important. Jordaning tends to increase the number of short fibers which are pulled through the wire and lost in the white water.

(*) A portion of a thesis submitted by the junior author in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Master of Science from Lawrence College, Appleton, Wisconsin, June, 1941.

(1) Technical Director, (2) Graduate Student, The Institute of Paper Chemistry.

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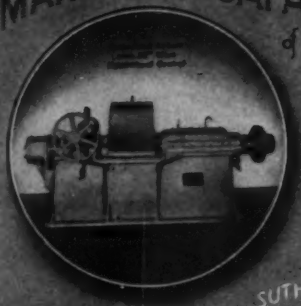

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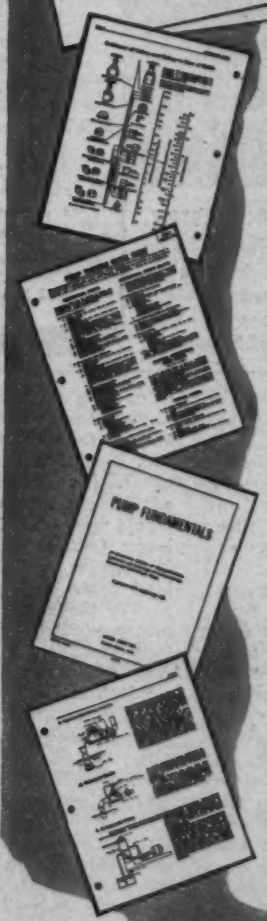

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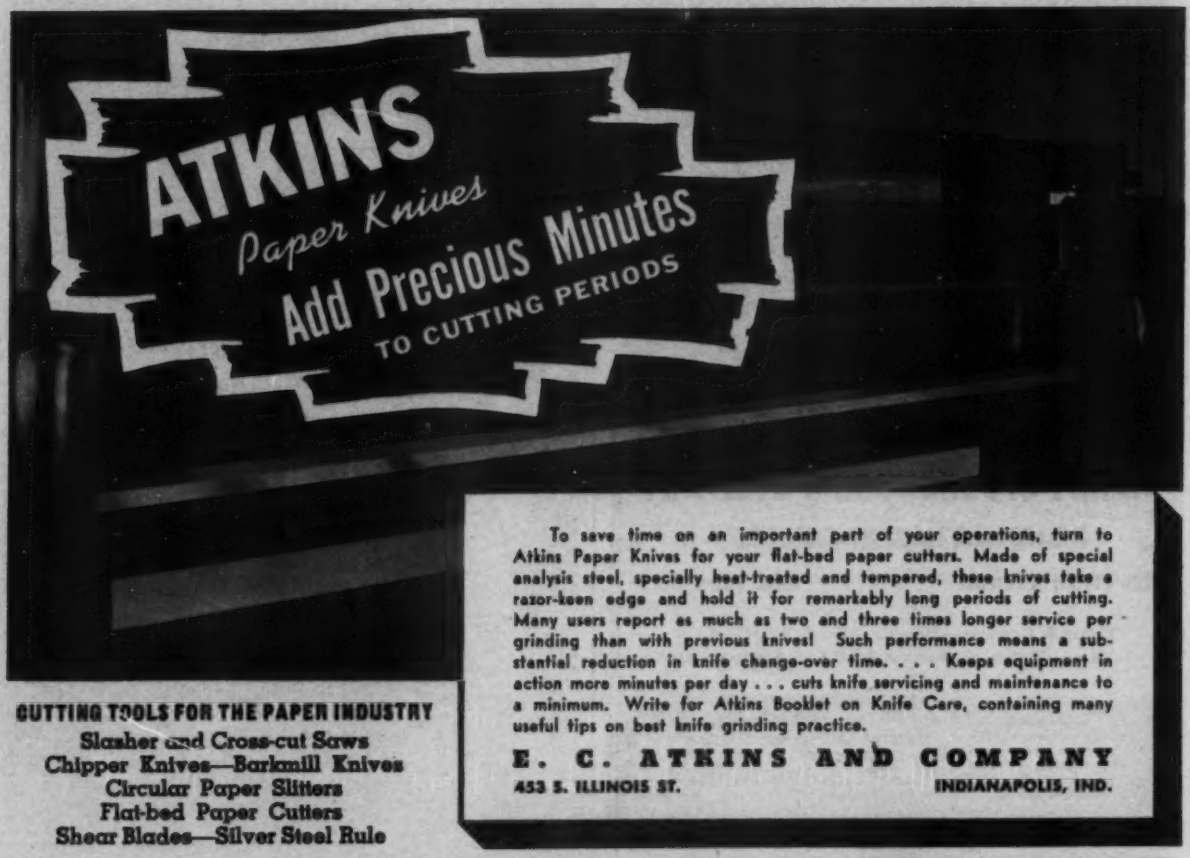

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Short-fibered stock, fillers, and such materials are carried through the wire by the flow of water from the sheet. This separation of the furnish on the wire causes structural two-sidedness by making the wire side deficient in filler, short fibers, and in color. The washing action of the table rolls tends to increase this deficiency on the wire side.

Suction boxes can produce two-sidedness in three ways (Soderberg, Fred A., *Paper Mill* 61, No. 6:16-18, Feb. 5, 1938): (A) Materials, such as fillers and short fibers contained in the web, may be pulled out completely. (B) These materials may be drawn to the wire side. (C) They may be left intact on the felt side and carried away from the wire side. Therefore, the practice of graduating the vacuum on the suction boxes or of adding an extra box or two has been beneficial. Suction rolls give a great deal of trouble for the same reason. Some mills add color to the wire side of the sheet by suitable rolls to equalize depth of color of felt and wire side of the sheet.

Pressing of the sheet many times results in two-sidedness, particularly if the sheet is not reversed and the same side is always in contact with the felt on the machine. One of the worst causes of the duplex-colored sheet is found in the drying operation. This may result from contact of the cold wet sheet against the hot surface of the first dryer (TAPPI, Special Report 74, New York, TAPPI, 1927. 15 p.) and is especially true with colors which do not have a marked affinity for the fibers. Calendering and supercalendering only intensifies the two-sidedness of a sheet, particularly structural two-sidedness (Ekholm, Ivar, *Paper Mill* 57, No. 17:13, April 28, 1934). Several investigators have noticed that in certain cases the finer portions of a pulp were more deeply colored than the longer fractions of the same pulp. An investigation revealed that in a sheet of bond paper, 18.2 per cent of the fines were on the felt side and 11.1 per cent on the wire side of the sheet. These two facts would seem to offer a reasonable explanation for the phenomenon of two-sidedness of colored paper, especially since they are consistent with the fact that the paper is more deeply colored on the felt side. For this reason it seems logical to study the affinity of various dyestuffs for the fiber and fine fractions of pulps.

Samples of western hemlock bleached and unbleached pulps were fractionated using the Bauer-McNett classifier. In this manner four fractions of the pulps were obtained. A special method was devised to obtain the fines (that fraction which passes 150), because filtering the water passing from the classifier proved too slow.

From the work done in this investigation, and by others, it was evident that all dyestuffs seemed to show a greater affinity for the fines than for any other fraction of the pulp. Therefore, the chemical and physical properties of each fraction of pulp were investigated in an effort to explain this variation in dye adsorption.

Microscopic slides were prepared and fiber length measurements made.

Only the long fraction and fines of both the bleached and unbleached pulp were analyzed, because they represent the two extremes in fiber length, using in general, TAPPI standards.

The results of the chemical analysis show very definite differences in the chemical composition of the fines and the long fractions.

Six different dyestuffs representing true dyestuffs and pigments were used in this investigation. The dyestuffs used were:

1—Orange II concentrated.
2—Brilliant green crystals.
3—Soluble Prussian blue.
4—Sky blue 6BX.
5—Dispersed vat color pigment.
6—Phosphotungstate blue.

From the limited data obtained in the study of handsheets, these conclusions can be drawn:

Fines have a greater affinity for dyestuffs because of: (a) the relatively larger percentage of pitch or resinous matter present; (b) the increased amount of degradation, hemicellulose, oxycellulose, etc., as shown by increased alkali solubility, increased copper number, decreased viscosity, and decrease of alpha-cellulose and increase in beta-cellulose; (c) their greater lignin content, which aids in the adsorption of basic dyestuffs.

Fines have a much greater tendency to settle because of their higher specific gravity and lower hydrodynamic resistance.

The fines are concentrated on the felt side of a sheet made on the paper machine, but on the wire side of a sheet made on a

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sheet mold. This is a result of the difference in conditions under which the sheets are made, fines being lost from the wire side on the paper machine because the sheet is formed so rapidly that there is no appreciable time for the fines to settle to the wire side of the sheet; there is a decided loss of fines occurring through the action of the table rolls and suction boxes.

Colored fines added to an undyed pulp and made into a sheet are so completely dispersed that they behave like pigment dyestuffs.

Sheets made from pulp of uniform fiber length show little tendency of being two-sided.

The investigation of the six classes of dyestuffs leads to the following conclusions as to the characteristics of each class of dyestuff as judged from the study of only one dyestuff.

A) Direct dyes showed a marked affinity for cellulose, regardless of the fiber length. They differ with respect to the relative amount picked up by the fines and the long fraction, yet this difference is much smaller than in any other case. This class of dyestuffs, therefore, should have a minimum tendency for two-sidedness.

B) Acid dyestuffs show little affinity for cellulose but have a fair affinity for the fines. Two-sidedness is easily caused in drying when this type of dye is used. Orange II showed marked two-sidedness tendencies.

C) The basic dyestuff showed a marked affinity for the unbleached pulp, and a much less affinity for bleached fibers. The amount of dyestuff taken up by the fines was much greater in comparison with the other fraction. This dyestuff has strong two-sidedness tendencies.

D) Pigment dyestuffs have a fair degree of affinity for all fractions of the pulp. The amount of color taken up by the fines is the greatest, but the difference is less than with acid or basic dyestuffs. This class of dyestuffs will produce two-sidedness in machine operation.

E) Vat dyes have little affinity for cellulose fibers and retention is very poor. The fines still retain the greatest amount of color.

F) The phosphotungstic acid dyestuff had little affinity for cellulose fibers, the greatest amount of color again being retained by the fines. In light dyeings its two-sidedness tendencies should not be too great.

G) The variables in the dyeing of the long and short fibered fractions are minor in their effect in producing a two-sided colored sheet in comparison with the factors affecting sheet formation on the paper machine.

Gypsum in the Sulphate Recovery Process

T. T. COLLINS, JR.,[1] H. J. HOTZ,[2] and E. WIBERG[3]

In the early part of 1929, H. J. Hotz and E. Zeumdell, chemists for the Central Paper Company of Muskegon, Michigan, conceived the idea of using gypsum to increase the sulphidity of cooking liquor and,

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when mixed with soda ash, to replace salt cake as a makeup chemical.

The sodium carbonate and carbon for the reaction were to come from the black ash and the sodium loss was to be made up either at the furnace or the causticizing tank with soda alkali. They also assumed that the calcium sulphide would be converted into sodium sulphide in the dissolving tank and would result in a saving in the amount of lime used for causticizing the liquor. It was not until after the theoretical aspects had been discussed that several test runs were made.

The earliest experiment was that of the addition of gypsum along with the regular salt cake charge to increase the sulphidity of the cooking liquor. The data are incomplete, but the following summary shows the general results obtained. The following liquor titrations are expressed as pounds of Na_2O per cubic foot.

A. With salt cake alone

	Green Liquor	White Liquor
Na_2CO_3	4.02	0.85
NaOH	1.29	4.46
Na_2S	1.98	1.98

Furnace production 972 pounds of titratable alkali per hour

Sulphidity—27.2 per cent, Causticity—61.2 per cent, Activity—88.3 per cent.

B. With salt cake plus 160 pounds of gypsum per hour

	Green Liquor	White Liquor
Na_2CO_3	3.90	0.89
NaOH	1.27	4.30
Na_2S	2.29	2.27

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Furnace production 915 pounds of titratable alkali per hour

Sulphidity—30.4 per cent, Causticity—57.6 per cent, Activity—88.0 per cent.

An anticipated saving in the lime used for causticizing was not realized.

Tests covering a period of several days were made recently with the same furnace used for the earlier experiments. The source of calcium sulphate was so-called "land plaster" which contains 93 per cent calcium sulphate and is a finely ground powder. The source of sodium salts was a low grade of soda ash which analyzed 62.8 per cent Na_2CO_3 and 37.2 per cent inert.

For part of the tests the land plaster was added to the furnace instead of salt cake and an amount of soda ash equivalent to the sodium in the salt cake was mixed with the green liquor. The regular amount of sodium sulphate of 325 pounds per hour (142 pounds of Na_2O) was to be replaced with 335 pounds of land plaster (93 per cent $CaSO_4$) to maintain an equal sulphate input but through a misunderstanding the land plaster was cut to 263 pounds per hour or 78.5 per cent of the required amount. The average input of soda ash into the green liquor was 387 pounds per hour (142 pounds of Na_2O).

The average tests of the resultant liquors were as follows:

A. With salt cake

Furnace production (titratable Na_2O in pounds per hour) 982

Pounds of causticizing lime (85 per cent available CaO) used per pound of titratable Na_2O produced 0.61

Settling rate of causticized liquor (feet per hour) 4.1

White Liquor: Sulphidity—21.6 per cent, Causticity—63.9 per cent, Activity—85.5 per cent.

B. With calcium sulphate and soda ash

Furnace production (titratable Na_2O in pounds per hour) 1045

Pounds of causticizing lime (85 per cent available CaO) used per pound of titratable Na_2O produced 0.57

Settling rate of causticized liquor (feet per hour) 3.5

White Liquor: Sulphidity—18.9 per cent, Causticity—64.0 per cent, Activity—83.0 per cent.

A Further Comparison of Sodium and Calcium-Base Sulphite Acids

M. O. SCHUR[1] and R. E. BAKER[2]

In a previous paper (Schur, M. O., and Baker, R. E. *Paper Trade J.* 112, no. 20:38-43, May 15, 1941; *Tech. Assoc. Papers* 24:405-412, June, 1941) the authors discussed the comparative merits of calcium-base, sodium-base, and mixed calcium- and sodium-base sulphite acids in the preparation of bleached paper-grade sulphite pulp from a mixture of red spruce and balsam fir as determined from laboratory digestions. It was reported that no significant differences in pulp yield or quality were found with these acids when the cooking conditions were adjusted by means of a change in maximum temperature, to give in a total cooking time of 9.75 hours approximately the same degree of cooking with each acid as measured by the permanganate number of the unbleached pulp. It was pointed out, however, that when the same cooking conditions were used with each acid, the pulp obtained with the sodium-base acid had the lowest bleach requirement, or to obtain a pulp with a given bleach requirement, milder conditions, in this case a lower maximum temperature, were possible with the sodium-base acid than with the calcium-base acid. From the laboratory results obtained, it appeared that the saving in steam or cooking time which could be effected by the substitution of sodium-base acid for a part or all of the more usual calcium-base acid would not ordinarily justify the increased cost in chemicals.

More recent work, involving several different samples of mill chips of the kind used in the first study, has indicated that the original observation on pulp yield may not be general. In the case of these later laboratory cooks, made with the same equipment and procedures, the difference in yield of screened, unbleached pulp, and of bleached pulp (based on wood) was approximately 1.5 to 2.0 per cent higher for the sodium-base cooking acid than for the calcium-base acid. The yields were slightly higher for the sodium-base acid and slightly lower for the calcium-base acid than were obtained with the corresponding acids in the previous study. In the case of the mixed-base acids the differences in pulp yields, in these later cooks, were pro-

(1) Director of Research and Development, Brown Company. (2) Research Chemist, Brown Company.

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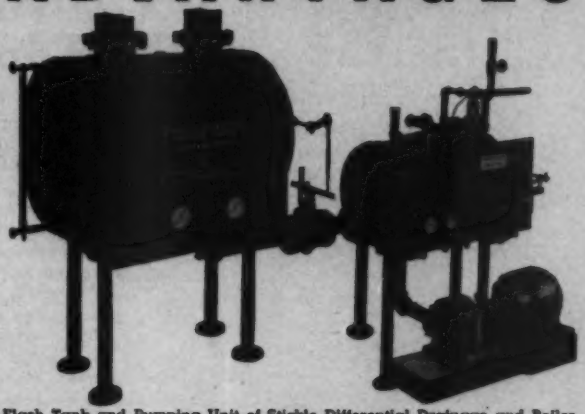

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portionate to the ratio of calcium to sodium.

In order to investigate further the comparative merits of the cooking acids in the sulphite pulping of spruce and fir, especially with regard to pulp yield, additional work has been carried out; however, instead of mixture of the two species, each has been studied individually. Also, in order that small differences in bleachability may not confuse the comparison, with each species of wood and with each type of acid a series of pulps with different permanganate numbers was prepared. This was accomplished by varying the cooking time.

Four series of cooks were made with each species of wood. In each series the cooking time was varied to produce five or six pulps with permanganate numbers ranging from 6 to 16. With each wood species the following cooking acids and maximum temperatures were used:

Sodium-base acid; 280 Fahr. maximum temperature.

Mixed-base (50/50 = Ca/Na as SO_2) acid; 280 Fahr. maximum temperature.

Calcium-base acid; 280 Fahr. maximum temperature.

Calcium-base acid; 290 Fahr. maximum temperature.

1.0 per cent combined SO_2 and 5.0 per cent free SO_2, unless otherwise stated.

With the same temperature schedule for each acid, and for a pulp with a low permanganate number, approximately one hour shorter cooking time was required for the sodium-base acid than for the calcium-base acid, while at the higher permanganate numbers this difference in time was only about one-half hour. With the mixed-base acid the pulping rate, as measured by the permanganate number-cooking time relationship, was intermediate between that obtained with calcium base and that with sodium-base acid. By the use of a 290 Fahr. maximum temperature approximately the same degree of cooking as measured by permanganate number was obtained in a given time with a calcium-base acid as with a sodium-base acid at 280 Fahr. maximum temperature, other conditions being the same. These relationships were true for both spruce and fir.

With sprucewood the differences in yield of screened, unbleached pulp with the different cooking acids depended upon the degree of cooking. With a sodium-base acid the yield increased with an increase in the permanganate number throughout the range studies, while with the calcium-base acid a maximum was reached at a permanganate number of about 12.

In the permanganate number range of 9 to 12 there were only slight differences in bleached pulp yield with the sodium-, mixed-, or calcium-base acids when the same maximum temperature was used; however, when 290 Fahr. maximum temperature was used for the calcium-base acid, the bleached pulp yield, based on wood, was about 0.8 per cent lower. The difference in bleached pulp yields obtained with calcium-base and sodium base acids, respectively, increased, however, as the permanganate number was raised or lowered outside this range. The bleached pulp yields obtained with the mixed-base acid were somewhat intermediate between those obtained with the calcium-base and with the sodium-base acids for the pulps of low bleach requirements, although, at the higher permanganate numbers the yield obtained approached more closely that obtained with the sodium-base acid.

Milder cooking conditions, either a shorter cooking time or a lower maximum temperature, were possible with the sodium-base acid in the preparation of a pulp of a given permanganate number than with the calcium-base acid. This circumstance was probably one of the factors causing a higher pulp yield with the sodium-base acid. Although the results obtained were somewhat erratic, the pentosan content, in general, increased with an increase in the permanganate number, and was higher for the pulps cooked with a sodium-base acid than with a calcium-base acid. Also, when the higher maximum temperature was used with the calcium-base acid the pentosan content was lower.

Viscosity tests made on the unbleached pulps indicated that, at a given permanganate number, pulps of higher viscosity were obtained with the sodium-base acids than with calcium-base acids. In general, the values obtained with a mixed-base acid were intermediate. For a given permanganate number, the viscosity obtained with a calcium-base acid at 290 Fahr. maximum temperature was lower than for the same acid at 280 Fahr. maximum temperature.

With the sprucewood there was, in general, a tendency for the sodium-base acids to give pulps of higher bursting strength and lower tearing resistance in the standard beating test than the calcium-base acids.

With the balsam fir wood, the same differences in bursting strength were obtained as with the sprucewood—i.e., a higher bursting strength after 30 minutes beating was obtained with the sodium-base acid pulps than with the calcium-base acid pulps cooked to the same permanganate number. However, with the balsam fir, the tearing resistance of the unbleached pulps was about the same for the different acids, although the tearing resistance of the bleached pulps seemed to be higher when calcium-base acid was used.

In general, an increase in bursting strength and a decrease in tearing resistance were noted as the permanganate number increased.

In general, the slowness developed by the pulps prepared with the calcium-base acid at 290 Fahr. maximum temperature was lower than for those prepared with either calcium- or sodium-base acid at 280 Fahr. maximum temperature. The unbleached pulps showed a slight tendency or none at all to increase in slowness with an increase in permanganate number; the bleached pulps, on the other hand, tended to increase in slowness slightly with an increase in the permanganate number of the corresponding raw stock.

It is significant that in the laboratory experiments involving spruce, with an 0.80 per cent combined SO_2 sodium-base acid, the pulp yields were the same as obtained with a 1.0 per cent combined SO_2 calcium-base acid, and the pulp properties were equally as good, yet the cooking time was 1.5 hours shorter with the 0.8 per cent combined SO_2 sodium-base acid. With fir, the conclusion was somewhat similar, except that the pulp yields were higher with 0.80 per cent combined SO_2 sodium-base cooking acid than with either 1.0 or 1.2 per cent combined SO_2 calcium-base cooking acid.

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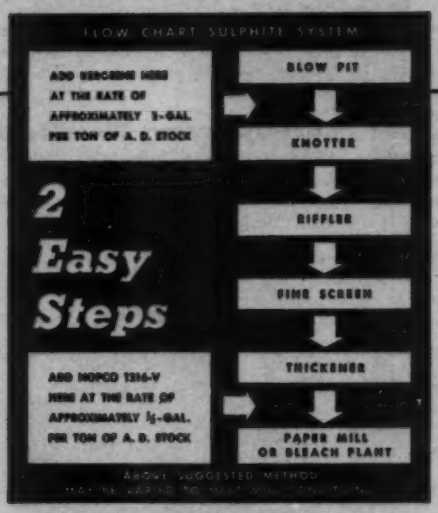
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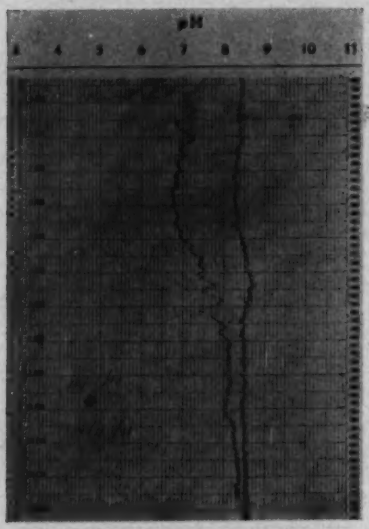
Multi-Point pH Recorder

Cambridge Instrument Co., Inc., Grand Central Terminal, New York, N. Y., has announced the development of a *p*H recorder which permits installation of measuring electrodes at a number of separate and independent sampling points and which gives a single-chart record of such a multi-point installation. The measuring



electrodes are connected electrically to the recorder which may be a considerable distance away. The simultaneous determination of *p*H in the beater and in the headbox, together with the *p*H of white water, was cited by the manufacturer as a typical example of an advantageous application of the instrument in a paper mill.

New Blackout Bulb Unit

Wabash Appliance Corp., 335 Carroll St., Brooklyn, N. Y., has announced specification changes in its blackout bulb (Cf. *P. I. & P. W.*, March, 1942, p. 1288). These changes include: change in color of light from blue and red to deep orange; reduction in size from 25 watts to 15 watts; elimination of built-in reflector; and improvement in black silicate coating to prevent light leakage.

The deep orange light that the new unit provides is said to permit room occupants to see each other plainly, as well as furniture, doors, and windows. The bulb will fit any household socket.

Robot Sentry System

A robot sentry system for use in connection with high wire fences, invented by a Du Pont Company engineer, is being manufactured for general use by Automatic Alarms, Inc., Youngstown, Ohio. This system, designated as *acoustic fence apparatus*, has the effect of multiplying by many times the number of guards on duty. It makes it possible for a watchman to hear what is going on along a fence line of several miles in length and to tell instantly the location of any disturbance. The system also permits a guard along the fence at any point to report to headquarters—delivery being made at headquarters through a loudspeaker or on a moving tape or drum, showing the exact hour, minute and second received. Signals also may be arranged to ring a bell, or may be relayed automatically to a police station. In use, the system is adjusted to screen out extraneous sounds and to pick up only those likely to be important.

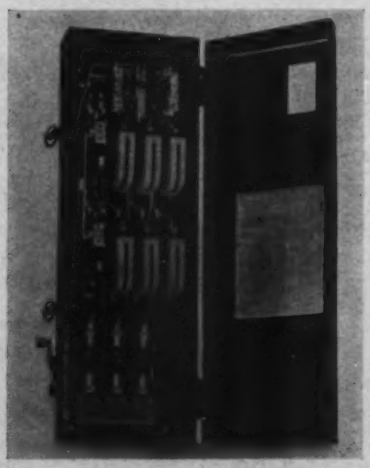
A-C. Combination Magnetic Reversing Starter

General Electric Co., Schenectady, N. Y., has announced an alternating-current combination magnetic reversing starter for full-voltage starting and reversing of squirrel-cage induction motors. Also suitable for primary control of wound-rotor motors, the starter consists of two mechanically interlocked reversing contactors, a two-pole overload relay, and either a circuit breaker or a fusible or non-fusible motor-circuit switch.

The starter is made in NEMA sizes 0 to 4, covering single phase and three phase motors in sizes up to and including 100 hp. at 440 or 550 volts.

The fusible form combines a manually operated motor circuit switch with clips for cartridge type fuses. The motor circuit switch is operated from the outside of the enclosing case by a handle so interlocked with the cover that the switch must be in the *off* position before the cover can be opened.

The circuit breaker form provides simultaneous tripping of all phases on short cir-



cuits, and has a trip-free mechanism which prevents holding the breaker closed under short circuit conditions. The breaker can be reset after operation by returning the operating handle to the *off* position.

When the starter is used in conjunction with a momentary contact push-button station, undervoltage protection is provided by an electrical interlock on each contactor. An isothermic temperature overload relay protects the motor from dangerous overheating caused by overloads and other conditions.

Cool-Operating Floodlight

Revere Electric Mfg. Co., 2949 N. Paulina St., Chicago, has announced a floodlight for use where explosive dust is prevalent. Designed for cool operation, the

interior of the floodlight is arranged with space between the housing and the inner reflector and between the inner reflector and the lamp. Connecting air current set up in this area dissipate the heat generated by the lamp. The lens ring is equipped with eccentric locking clips which together with an impregnated asbestos gasket hold the ring tightly in closed position. The complete unit is available in 75-100 and 150-200 watt sizes for ½ in. or ¾ in. conduit mountings.

New Manganese Steel Welding Rod

A manganese steel welding rod, known as *V-Mang*, has been announced by the American Manganese Steel Division of The American Brake Shoe and Foundry Co., Chicago Heights, Ill. In addition to molybdenum and other elements, this rod contains 12 to 14 per cent of manganese. It is available in ⅛, 5/32, 3/16, and ¼-in. diameters and in 18-in. lengths, a standard container holding 50 lb. of rod. The manufacturer suggests the rod for use in repairing fractures in manganese steel parts as well as for build-up work.

New Load-Center Unit Substation

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has announced a new standardized load-center unit substation. Available for either indoor or outdoor service and in sizes ranging from 100 to 2000 kv.-a., the substation consists of a metal-enclosed incoming-line section, a throat-connected transformer, and a low voltage feeder section.

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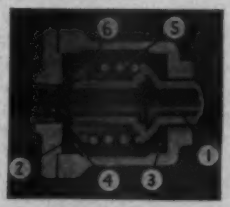

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A compact and portable safety transformer which may be plugged in any 110 volt a.c. circuit has been developed by the Acme Electric & Mfg. Co., Cuba, N. Y.

This unit provides for two 32-volt a-c. extension lines. It is suggested by the manufacturer for use in supplying light to workmen who must perform their duties under conditions in which explosive gases or vapors exist, for use where inflammable materials are stored or in process, and for use where the possibility of a high voltage spark may cause considerable damage. It also is claimed to be particularly adapted for inspection work where workmen must come in contact with moist surfaces or conditions since severe shock is prevented by the lower voltage. The unit is heavily insulated throughout, and is approved by the Underwriters' Laboratories.

Remote Valve Control Unit

A newly designed unit for the manual control of remote valves, dampers and other pneumatically operated equipment has been announced by The Foxboro Co., Foxboro, Mass. When flush-mounted, its front

surface is only 7/16 in. from the surface of the instrument panel. Specifically designed for dead-end service, the unit, practical for operation over distances up to 1000 ft., will hold reduced pressures to valves within very narrow limits.

Camouflage Paint

The Truscon Laboratories, Caniff & G.T.R.R., Detroit, Mich., has announced a camouflage paint. This product, known as *Truscon Camouflage Coating*, is available in the following colors—loam, dark green, field drab, light green, olive drab, earth red, earth brown, earth yellow, sand, black, and white. The colors, being dead flat, do not show any mirror-like reflection or high lights even when viewed at sharp angles.

Luminous Blackout Paint

Maas & Waldstein Co., Newark, N. J., has announced a luminous blackout paint which can be applied to objects of all kinds and renders them visible in the dark. The new paint, *Durad Luminous Paint*, must be used over a special primer and thinned out with a special thinner, both of which are supplied with the paint. One thick coat, or preferably, several thin coats, of the paint produces a flat white finish suitable for indoor service. For a glossy finish, or for outdoor service, the paint is covered with a special clear topcoat. Each coat air-dries in from one to four hours depending upon weather and other conditions.

According to the manufacturer, this paint, after exposure to either daylight or ordinary electric illumination for a few minutes, glows for about 20 hours and repeats the action after re-exposure.

Two First-Aid Products

Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh, Pa., has added a new folding stretcher and a new wood traction splint to its line of first-aid items.

The stretcher (49 in. long when folded) has a frame of ash, and a cover of 12 oz. duck. Metal parts are of malleable iron. The stretcher is part of an all-weather unit, which, in addition, includes a steel case, a wool and a rubber blanket, four wood splints, two chemical hot pads, and a 16-unit first-aid kit.

The splint, designed for use in supporting fractures of the arms or legs according to the accepted traction method prescribed by the American Red Cross, is made of hard maple with chamfered edges and shellac finish. It is extensible to 66 in., and telescopes to a compact size.

Commutator Cleaning Stone

Ideal Commutator Dresser Company, 4162 Park Ave., Sycamore, Ill., has announced a cleaning stone for removing film and dirt from commutators. The stone is used by simply holding it against a commutator and slowly moving across the face, the operation being performed while the motor or generator is running. The manufacturer states that the stone does not clog, nor cut the commutator.

Skid Platform

The Yale & Towne Mfg. Co., Philadelphia, Pa., has announced the development of a skid platform, the *Timber-Lock*, which utilizes oak lumber in both platform deck and frame. Near each end of the skid, on the underside of the deck is a deep cut groove into which fits a supporting leg

beam. To further insure rigidity, the beam and deck are bound together with cement-coated nails. Legs of formed steel bars are joined to the leg beams by steel bolts in a manner to insure leg stability. The platform is available in all standard widths and lengths, with plain or armored ends, in vertical or standard leg design and in four or six leg construction.

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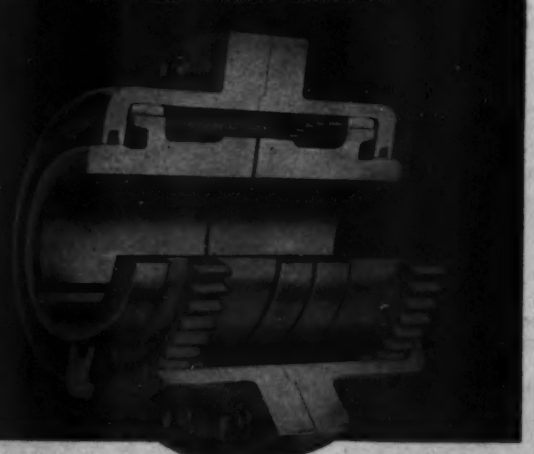
POOLE



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This Is NO TIME To Be a Squirrel!

Squirrels, you know, are always hiding away more food in the ground than they can possibly use.... But for some reason, there always seems to be enough food around to save them the trouble of digging most of it up.

Probably some companies, unintentionally of course, are playing "squirrel"... by tucking away supplies of alkalies "just in case something happens..."

This is an excellent way to help make that "something" happen *right here at home!* If you build up alkali inventories beyond normal requirements, you are taxing production facilities, and preventing delivery of vitally important basic war materials that are urgently needed *now* for the production of ammunition, guns, airplanes, clothing and hundreds of other war necessities.

There is actually no necessity for "stocking up" on alkalies. The raw materials for making alkalies are abundant in America. There are many giant plants now manufacturing tremendous quantities of the finished product. Obviously, war needs come first, which may necessitate sacrifices on the part of companies not producing war materials. In general, however, there are enough alkalies to go around *if none of us plays squirrel.*

★ ★ ★

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TECHNICAL DEVELOPMENTS

These abstracts are of the latest developments found in the American and foreign press.

Deciphering Charred Documents

Charred paper documents have taken on a new significance in England due to fires caused by bombing. In general, the more heavily loaded the paper, the more easily can the writing be read without further treatment after charring. Inks leaving a mineral ash, such as writing inks, and some colored printing inks, can be read more readily than can carbon inks or those based on organic dyes. This is especially true when the ink residue reacts chemically to form a colored substance. Black lead pencils, in which clay as well as graphite is present, record the outlines of the original writing. Really difficult problems arise with typewritten sheets and carbon copies. Ink handwritten documents require special care since there are normally no duplicate copies. Due to their brittleness and cockled appearance, the preparation of charred specimens becomes important. Attempts to straighten them cause breaks. Often the use of steam facilitates straightening, and the paper residues can then be mounted cautiously on a transparent base and protected by coatings of varnish or gelatine.

None of the methods used in deciphering is universally applicable. In one, the specimen is treated repeatedly with chloral hydrate, and dried at 60 C. until crystals form on the surface, and the writing can be read or photographed. Treatments with 5 per cent aqueous silver nitrate solution have also been used to intensify the residual writing. The sheets treated for 3 hours are rinsed and rapidly dried, but the intensification takes place only when the ink reduces $AgNO_3$ to metallic silver. Iron inks may deposit iron oxide, which may at times be intensified by the use of ferrocyanide (blue coloration). This becomes inapplicable when the paper itself contains iron impurities as is frequently the case. Infra-red photography has the advantage of leaving the charred sample intact.

Whether or not the method is practical depends on the degree to which the paper has been carbonized. Photography is required to make the writing visible. At times the charred sample may be sandwiched between two fast photographic plates, the idea being that the gases given off by the charred paper fog the plate, excepting where ink residues hinder such escape. Another method entails photographing the document in a narrow beam of light, so directed that it gives the greatest possible difference in reflecting power between the charred paper and the ink. Here flattening the paper becomes the greatest problem.

The author advocates the use of ultraviolet light after treating the paper with a fluorescent oil (ordinary lubricating oil serving the purpose). The ink residues and the charred paper usually absorb the oil to different extents, so that in ultraviolet light there is the necessary contrast for reading. These differences in oil absorption differ in various documents, depending on the degree of charring, the nature of the ink, etc. Only if the paper and the ink absorb the oil to the same extent, will the contrast fail to exist, but in the author's experience negative results were obtained in only one case. The suggestion is made that even here, if the ink were first chemically treated, and then treated with the fluorescent oil, the difficulty might be overcome. The oil treatment also has the advantage of rendering charred residues less brittle. J. Grant. Paper-Maker and British Paper Trade J. 102, Annual Number (1941) 40-2.

Sulphite Waste Liquor Evaporation

These are the results of two totally different investigations, the first taken from a Russian, the second from a Swedish publication. Concentrated waste liquor may be burnt under steam boilers in pulp mills. Dry substance in the waste liquor is concentrated down to 40-50 per cent. The amount of water evaporated corresponds to 0.8 ton/ton liquor and in a multiple evaporator thus corresponds to 0.27-0.30 tons of steam per ton. The author discusses methods for decreasing this steam consumption and suggests the following: In the sulphite waste liquor, the sugar fraction is first fermented to alcohol and for the distillation of this, 1.1 ton of steam per ton of pulp is required. The residual sulphite liquor is then passed into a three-still evaporator, the first and second of which are heated with steam at 4-5 atmospheres. The steam from the first still is used for heating the alcohol column and water. The third still utilizes steam from the second still, and operates under reduced pressure produced by the surface condenser where the steam heats the water to 45-50 deg. By surplus steam from the first still, this water is heated further to 70 deg. Condensates from the first and second stills are used in boiler feeds. Variations are outlined.

In the second paper, another author discusses waste liquor evaporation with the flue gases and by means of steam. The value of the following methods from the standpoint of heat economy is discussed: (I) pressure steam multiple-step evaporation, (II) vacuum multiple-step evaporation, (III) preliminary concentration by means of indirect steam, followed by evaporation by use of heat from flue gases. The principal difficulties encountered in (I) and (II) are encrustations of heating surfaces. These may be satisfactorily dealt with by the proper design of equipment. Individual examples then show (and these are supplemented by graphs covering the entire range of sulphite liquor concentration) that the heat economy in (I) is the most, and in (III) the least satisfactory. The author has shown diagrammatically the return on investment and the relative costs under comparable conditions for (I), (II), and (III). Problems entailed by burning liquor containing 50 per cent solids as against dry powdered solids are discussed. The most vital factor for heat balance lies in the initial liquor concentration, and great strides have been made in so washing sulphite pulp that the wash waters contain a large part of the sulphite waste liquor with a relatively high solid content. (1) Z. Akkerman, Bumazhnaya Prom. 17, No. 9, 24-8 (1939); Khim. Referat Zhur. (1940) No. 2, 126, (2) C. Rosenblad, Svensk Papperstidn. 44, 432-7 (1941), both through C. A., 36, 2411 (1942).

Waste Liquor from Bagasse Soda Pulp

These are the results of laboratory experiments. When 438 grams of bagasse were treated with dilute hydrochloric acid, and then cooked with 15 per cent NaOH at 4 atmospheres for 1 hour, 8 liters of waste liquor were obtained. From this 62.7 grams soda-lignin (A) were precipitated on acidification to obtain a 2 per cent HCl solution, followed by heating to 95-100 deg. for several hours. This showed a loss of 26.8 grams of lignin (when calculated to the lignin content of the original bagasse and accounting for the residual lignin in the pulp). When reprecipitated from acetone or glacial acetic acid, a pale brown powder, m. 147-9 C., was obtained, which was soluble in sodium carbonate alcohol, acetone, and glacial acetic acid. It gave positive reactions for aliphatic and aromatic hydroxyls, methoxyl, and carboxyl groups. Destructive distillation in vacuo yielded 25.5 per cent of an oil which contained appreciable amounts of phenol, and small amounts of cresol and xylenol. K. Honda and Y. Nakamura. Cellulose Ind. (Tokyo) 17, 229-32 (1941); C. A. 36, 2135 (1942).

Grease Resistance Measurements by Ultraviolet Light

Glassine or transparent papers present difficulties when it comes to determining whether or not grease has passed through the sheet. If fluorescent substances are added to the grease, this difficulty disappears. Mineral oils can serve the purpose, or in the case of butter a dye (like auramine) can be added. When the fluorescence is strong, the outside of the paper being tested is brushed from time to time with a pointed brush made of nonfluorescing bristles. The tip of this brush is then examined for fluorescence in ultraviolet light against a dark background. J. Grant, Analyst, 67, 13 (1942) through C. A. 36, 2410-11 (1942).

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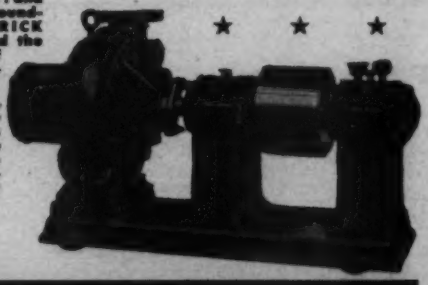

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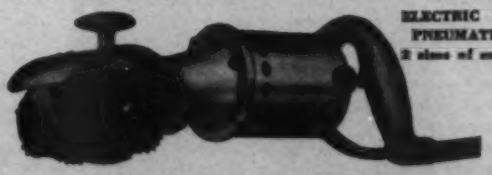

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PAPERMAKING PATENTS

IN THE UNITED STATES — Compiled by James Atkins, Registered Patent Attorney

Inquiries should be addressed to James Atkins, Munsey Building, Washington, D. C.

Belting for Use as Paper Felt, Industrial Felt, Pulp Felt, Drier Felt, and the Like

Patent No. 2,271,295. Percival T. Gates, Montclair, N. J., assignor to Drycor Felt Company, Belleville, N. J., a corporation of New Jersey. Application January 10, 1939, Serial No. 250,193. 2 Claims. (Cl. 28—1). As a new article of manufacture, a paper maker's felt for supporting and draining paper making material, comprising a woven base having warp and weft threads and nap producing fibres penetrating said base through the interstices between said warp and weft threads and projecting at the top and bottom, and an adhesive substance impregnated in the marginal portions of said material contiguous to its longitudinal edges to form a binder between the fibres and the woven base and interlocking the warp and weft threads of the woven base at the edges to render said marginal portions resistant to sleaziness and abrasion, said marginal portions being of greater density and relatively thinner than the remainder of the material whereby in passing between rollers said edges allow clearance to produce an even pressure across the felt upon the paper material supporting surface.

Process for Softening Paper

Patent No. 2,268,674. Murray H. Roth, Brooklyn, N. Y., assignor to The Richards Chemical Works, Incorporated, Jersey City, N. J., a corporation of New Jersey. Application September 9, 1939, Serial No. 294,135. 4 Claims. (Cl. 106—287). A softening agent for paper comprising an aqueous solution containing 20% by weight of unreacted urea, 10% by weight of glycerine, 10% by weight of talc, and 60% by weight of water.

Slice for Papermaking Machines

Patent No. 2,268,840. Michael James Alphonsus McGuire, Ottawa, Ontario, and Robert Baptie Connon, Gatineau, Quebec, Canada. Application May 6, 1939, Serial No. 272,072. In Canada February 15, 1939. 5 Claims. (Cl. 92—44). In a paper-making machine having an apron, a head box containing pulp stock and a wire, said head box having its front wall constituting a slice and a pulp stock orifice between the lower edge of said front wall and said apron whereby a pulp sheet may be delivered through the orifice onto the wire, means for maintaining uniform thickness in said sheet comprising a beam extending transversely of said front wall in parallel relation thereto, supports for said front wall extending therefrom to said beam, said supports being anchored to the front wall at points spaced above the lower marginal portion thereof adjacent the top of the lip of the slice and lying within the zone of maximum static head pressure of pulp stock on the wall, and means for independently adjusting the length of each of said supports to apply adjusting forces to said front wall at said points and thereby maintain said lower edge a uniform distance from said apron.

Papermaking Machinery

Patent No. 2,270,465. William C. Nash, Neenah, Wis., assignor of one-fourth to Mary Jones, Neenah, Wis., one-fourth to William M. Nash, Menasha, Wis., one-fourth to Roy A. Nash, Bronxville, N. Y., and one-fourth to Marie Duvall Nash, Neenah, Wis. Application January 11, 1939, Serial No. 250,296. 1 Claim. (Cl. 92—44). A machine for making a felted fibrous material which comprises a breast roll and a couch roll spaced therefrom, an endless paper forming wire carried around said breast roll and couch roll, means for discharging aqueous fibrous pulp upon said paper forming wire on the upper pass thereof adjacent said breast roll, a suction box positioned closely adjacent said breast roll beneath the upper pass of said wire, said suction box having an opening which faces the paper forming wire at its upper pass whereby the pulp upon said wire is substantially immediately subjected to suction upon its deposition upon said wire to quickly form a preliminary fibrous film upon said wire during passage over said opening, a plurality of tube rolls disposed transversely beneath said wire upon which said wire rides during its upper pass after passing over said suction box, means for moving said tube rolls transaxially in the direction of travel of said paper forming wire, and a suction box positioned beneath said wire and having an opening which faces said wire at its upper pass and after it has passed over said tube rolls, a foraminated roll rotatable in said last mentioned suction box which protrudes through the opening in said box and upon which said wire rides, and a press roll positioned immediately above said foraminated roll whereby said wire and web carried thereon is subjected to pressure between said rolls.

Evaporator

Patent No. 2,262,519. Joe E. Talton, Crossett, Ark., assignor to Crossett Paper Mills, Crossett, Ark., a corporation of Arkansas. Application March 21, 1940, Serial No. 325,124. 1 Claim. (Cl. 159—20). In a multiple effect evaporator for concentrating liquids, a plurality of evaporator tube units comprising five units maintained at successively higher temperatures and pressures, means for feeding a liquid to be concentrated into the fourth and fifth units maintained at lower temperatures and pressures than the other three units, means for successively passing partially concentrated liquor from the fourth and fifth units to the third, second and first units, and means for returning a portion of the partially concentrated liquor from the feed liquor to the third unit to the feed liquor to the fourth unit.

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July 1, 1941 to June 30, 1942

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PERFECT SCORES

Division I—Pulp and Paper Mills

PARTICIPANT	MILL	LOCATION
GROUP A		
GROUP B		
St. Croix Paper Co.	Woodland	Maine
GROUP C		
American Writing Paper Corp.	Parsons Div.	Holyoke, Mass.
The Mead Corporation	Harriman Div.	Harriman, Tenn.
Marathon Paper Mills Co.	Ashland	Wisconsin
GROUP D		
U. S. Gypsum Company	Oakmont Mill	Oakmont, Pa.
U. S. Gypsum Company	North Kansas City	Missouri
Spaulding Fibre Co., Inc.	Milton	New Hampshire
American Writing Paper Corp.	Mt. Tom Division	Holyoke, Mass.
International Paper Co.	Riley No. 23	Riley, Maine
Spaulding Fibre Co., Inc.	Hayes	New Hampshire
Division II—Paper and Board Re-Manufacturing		
Thilmany Pulp & Paper Co.	Bag Mill	Kaukauna, Wis.
Bird and Son, Inc.	Roofing Plant	Shreveport, La.
Bay West Paper Co.	Green Bay	Wisconsin

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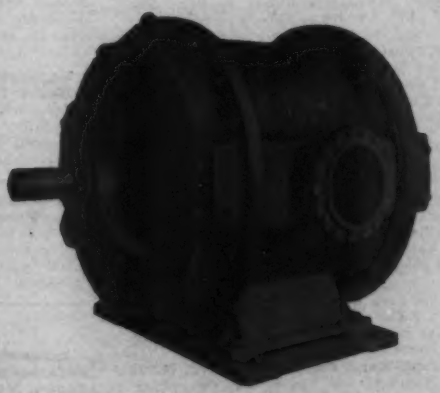

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New Catalogues, Ass'n Reports, and Publications

American Manganese Steel Div., American Brake Shoe & Foundry Co., Chicago Heights, Ill.—"The Amsco Bulletin" for March describes the uses of the various products manufactured by this company. How Amsco welding products conserve for defense, as well as aiding defense production are discussed.

Blackmer Pump Co., Grand Rapids, Mich.—A new line of direct-connected rotary pumps is described and illustrated in the new Blackmer Bulletin No. 110. Information on construction, principle of operation, and specifications of these pumps is included.

S. F. Bowser & Co., Inc., Fort Wayne, Ind.—This company has just prepared a new circular and a new booklet. The circular, "To Help You Win the War of Production," contains only a few of the Bowser products and is intended merely as a guide to the use of these products in industry. The booklet entitled "Flow Indicating Devices" clearly pictures the different types of flow indicating devices necessary for the efficient handling and control of liquids under various conditions. It includes illustrations and cross-sectional diagrams of the equipment as well as specifications.

Clark Tractractor, Div. of Clark Equipment Co., Battle Creek, Mich.—"Unit Packaging" is the new booklet published by this company emphasizing the part swift inter-plant movement of materials plays in all-out production for offense. Proper equipment and methods are recommended for solving problems that arise regarding materials handling.

The B. F. Goodrich Co., Akron, Ohio—Through its Industrial Products Distributors, this company has just issued an 11 x 17½ in. wall poster designed to further assist manufacturers and other users of industrial rubber products in the vital campaign to conserve every ounce of the precious material. The material is treated in poster style, entitled "You Must Save Rubber," and gives condensed, simple rules for conservation. This company also has just released a 4-page catalogue section on its recently announced synthetic rubber sponge, developed in its own laboratories, and made from its Ameripol synthetic rubber. Properties and characteristics are given, as well as dimensions for stock sizes of available slabs, tubing, cord, and molded shapes. The company advises that Ameripol sponge is controlled by the same Governmental restrictions that apply to natural rubber.

Ideal Commutator Dresser Co., Sycamore, Ill.—Eight ways to speed up production are given in a new circular just released. The "Ideal" live centers, electric etchers, electric marker, balancing ways, grinding wheel dresser, cleaners, demagnetizer, and washer punch are included, with illustrations. This company has also put out a 4-page circular on wire nuts, specifically stressing how their use saves time, vital materials, and keeps costs down.

Ingersoll-Rand Co., Phillipsburg, N. J.—The features of Class GT two-stage centrifugal pumps are thoroughly covered in a new 12-page, 2-color bulletin, No. 7167. Structural details of the pumps are described, and applications which have been found for the units in chemical plants, paper mills, etc., are cited.

L & R Mfg. Co., Newark, N. J.—Cleaning machines and solutions recently developed to clean large meters, gauges, and related precision mechanisms are described in a new booklet and circular. The L & R method of cleaning may be controlled and varied for each problem.

Leeds & Northrup Co., Philadelphia, Pa.—Smoke density indicating and recording equipment is contained in a 16-page catalogue recently issued by this company. This publication tells how boiler operators can "see" smoke simply by glancing at the big indicating dial of a Micromax smoke density recorder, and how smoke density is continuously recorded in red ink on a handy chart. For a copy, write to this company, 4934 Stenton Avenue, Philadelphia, and ask for Catalogue N-93-163.

Walter G. Legge Co., Inc., New York City—The elimination of slip hazards by the use of Legge non-slip floor polish, grip-tred, and other products is completely discussed in two new circulars prepared by this company. Safety, economy, and appearance are considered.

Link-Belt Speeder Corp., Chicago—Folder No. 1938 on this company's Model HC-70 truck-mounted crane has just been released. Brief specifications, clearance dimensions and lifting capacities are given including capacities with 30, 40, or 50 ft. long boom, with or without the use of outriggers. A copy may be obtained from this company.

Magnus Chemical Co., Inc., Garwood, N. J.—This company's new 50-page illustrated handbook entitled "Metal Cleaning in War Time" contains the complete story of metal cleaning problems in the production of shells, shell cases, fuses, other munitions, and other parts and objects involved in the production of material and equipment important to the war program. Charts, illustrations, and diagrams of washing machines used in the manufacture of munitions and vital metal articles are included. Copies on request.

Mercury Mfg. Co., Chicago—Complete information on the Mercury line of lift trucks, 6,000 lb. capacity, is given in a new brochure. The power truck skid method of handling is discussed, as well as the types of equipment in the system and the purpose of each. The three types of trucks, low, high, and telescopic are explained and illustrated. Specifications for each, and variations in the equipment to meet individual problems in materials handling are included.

Peabody Engineering Corp., New York City—A recent bulletin No. 203 describes in detail the improved Peabody combined gas and oil burner, with numerous diagrams and pictures. A copy will be sent upon request.

Roller-Smith Co., Bethlehem, Pa.—This company has just released a 12-page catalogue with information regarding small oil circuit breakers designed for use on alternating current circuits in industrial plants and power houses, where interrupting capacities of 50,000 KV-A are required. These circuit breakers have continuous carrying capacities ranging from 600 to 3,000 amperes at voltages up to 15,000 volts. Various methods of tripping, and attachments that can be supplied, are also discussed.

The Swartwout Co., Cleveland, Ohio—An appropriately indexed file folder containing two new bulletins, No. 214 and No. 215 has just been issued by this company. Bulletin No. 214 is composed of 24 pages, illustrating and describing the Swartwout line of roof ventilators for industrial and commercial buildings. Bulletin No. 215 is a comprehensive manual which includes a guide for estimating building ventilation and roof ventilator requirements, with instructions for installing Swartwout ventilators on various standard and special types of roofs.

Association Reports

All of the orders which affect the industry emanate from the OPA and WPB and clear through the office of E. W. Tinker, executive secretary of the American Paper and Pulp Association. Copies of all government orders are sent by the Association to members. Listed below are releases sent out during April by the APPA. Any correspondence with that office regarding these releases should carry identifying numbers under "National Defense."

Legislation and Public Affairs No. 102—Heavy Industrial Machinery L-83. This order, which is effective immediately, prohibits manufacturers from delivering new, used, or reconditioned machinery without WPB approval.

Legislation and Public Affairs No. 106—Maximum Price Regulation No. 114—Wood Pulp. Maximum Price Regulation No. 114 setting forth the maximum prices which may be charged for wood pulp was released to the public on April 14, 1942.

Legislation and Public Affairs No. 110—Sulphur—General Inventory Order M-132. This refers to Priorities Order M-132 which relaxes the inventory restrictions on sulphur. This order will enable users of sulphur to build up stock piles and thus avoid transportation tie-ups in the future.

The following reports are classified as Labor Relations, and this designation should be used in any correspondence.

Labor Relations No. 7—Bulletin on Suggested Training Program for Machine Operators in the Pulp and Paper Industry points the way to set up a training program in any given mill or plant. It is designed especially to meet the needs in connection with training machine operators, although the same methods can be used to meet most any job training situation that may arise.

Labor Relations No. 8—Company Policies with Regard to Military Service. Full information is listed as to policies being followed in relation to employees entering the armed forces of the United States or Allied Nations.

Books

Industrial Water for Pulp, Paper, and Paperboard Manufacture—Designated as Tappi Monograph Series—No. 1, this volume has been prepared under the direction of the Tappi Water Committee, and published by the Technical Association of the Pulp and Paper Industry. It is a paper-covered work of 145 pages, the page sizes being 6 in. by 9 in. The subjects treated in the volume are: characteristics of waters; water required for pulp and papermaking; filtration of water; flocculation; disinfection of water; removal of tastes and odors from water; corrosion and its control; softening of water; boiler feedwater preparation; and analyses of waters. The authors of the work are: John D. Fleming, Edward S. Hopkins, C. E. Imhoff, Ronald G. Macdonald, R. B. Martin, Lewis B. Miller, Eskel Nordell, Roderick O'Donoghue, J. G. Patrick, Everett P. Partridge, and Vincent F. Waters. Nonmembers of the Association may obtain the book from the Book Department, Technical Association of the Pulp and Paper Industry, 122 E. 42nd St., New York, N. Y., at $5.00 a copy.

Simple Blueprint Reading with Special Reference to Welding. (Second Edition)—Published by The Lincoln Electric Co., 12818 Coit Road, Cleveland, Ohio, this book is written for easy understanding. It consists of 146 pages (5½ in. by 8½ in.); and is bound in semi-flexible simulated cover. There are 96 drawings in the book more than 50 of which have been revised from the former edition. The illustrations include practical examples of drawings of a number of machine parts, pipe connections, general constructions, tanks, etc. The publisher has priced the book at 50 cents a copy postpaid anywhere in the U. S. A., 75 cents elsewhere.

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New White No. 1	3.00 to 3.25
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New Unbleached	3.25 to 3.50
Fancy	3.40 to 3.60
Linen Cuttings—	
White	14.00 to 14.50
Grey	13.50 to 14.00

RAGS (Domestic)
f. o. b. New York City

OLD RAGS

OPA ceiling prices in sales to consuming mills f.o.b. cars at points of shipment, with brokers' allowances of $1 to $3 a ton depending on the value of the grade involved.

	per ton
Roofing—	
No. 1	31.00
No. 2	29.00
No. 3 and No. 4	27.00
Twos and Blues—	
Repacked	44.00
Thirds and Blues—	
Repacked	44.00
Miscellaneous	38.00
Whites, No. 1—	
Repacked	76.00
Miscellaneous	64.00
Whites, No. 2—	
Repacked	58.00
Miscellaneous	53.00

RAGS (Foreign)
ex dock New York City

NEW RAGS

	per cwt.
New Dark Cuttings	Nominal
New Mixed Cuttings	
New Light Silesias	
Light Flannelettes	
Unbleached Cuttings	
New White Cuttings	
New Light Oxfords	
New Light Prints	

RAGS (Foreign)
ex dock New York City

OLD RAGS

	per cwt.
No. 1 White Linens	Nominal
No. 2 White Linens	
No. 3 White Linens	
No. 4 White Linens	
No. 1 White Cottons	
No. 2 White Cottons	
No. 3 White Cottons	
No. 4 White Cottons	
Extra Light Prints	
Ord. Light Prints	
Med. Light Prints	
Dutch Blue Cottons	
French Blue Cottons	
French Blue Linens	
Checks and Blues	
Linsey Garments	
Dark Cottons	
Old Shapporins	

ROPE and BAGGING
f. o. b. and ex dock New York City

	per cwt.
Gunny No. 1—	
Foreign	Nominal
Domestic	5.00 to 5.25
Wool Tares—	
Light	4.50 to 4.75
Heavy	4.75 to 5.00
No. 1 Scrap Bagging	4.25 to 4.50
Manila Rope—	
Foreign	—
Domestic	*115 00-
New Burlap Cuttings	5.50 to 5.75
Jute Threads—	
Foreign (Nom.)	6.25 to 6.75
Domestic	5.50 to 6.00
Strings—	
Sisal	3.75 to 4.00
Soft jute	4.75 to 5.00
Mixed	1.25 to 1.50

*OPA ceiling price per ton f.o.b. shipping point.

WASTE PAPER

OPA ceiling prices in sales to consuming mills f.o.b. points of shipment East of Rocky Mountains; additional $1 a ton loaded on freight cars and brokers' commissions of 4 to 9 per cent allowed.

	per ton
Shavings—	
White Env. Cuts, One-Cut	67.50-
Hard White Env. Cuts	62.50-
Hard White, Unruled	57.50-
Hard White, Ruled	50.00-
Soft White, One-Cut	57.50-
Soft White, Misc.	43.00-
Fly Leaf, No. 1	32.50-
Fly Leaf, No. 2	22.50-
Fly Leaf, Woody, No. 1	35.00-
No. 2 Mixed Col. Woody	18.00-
Mixed Colored	15.00-
Flat Stock—	
Overissue Magazines	33.50-
No. 1 Heavy Magazines	31.50-
Mixed Books	20.50-
Ledger Stock—	
No. 1 White	42.50-
No. 1 Mixed (Colored)	37.50-
Manilas—	
New Env. Cuttings	53 00-
New Env. Cuts, One-Cut	57.50-
Extra Manilas	37.00-
Manila Tab Cards, Free of Ground Wood	45.00-
Colored Manila Tab Cards, Free of Ground Wood	30 00-
Ground Wood Manila Tab Cards	27.00-
Ground Wood Manila Tab Cards, Colored	20.00-
Kraft—	
Envelope Cuttings	65.00-
Mixed Env. or Rag Cuts	55.00-
Tripled Sorted No. 1 Brown	50.00-
New 100% Cor. Cuts	45.00-
No. 1 Old Assorted	35.00-
News—	
White Blank	33.00-
Overissue	17.00-
No 1 Baled	15.00-
Old Corrugated Boxes	16.50-
New Corrugated Cuts	18.00-
Box Board Chips	14 50-
Dry Goods Waste	14 00-
No. 1 Mixed Paper	14.00-

CHEMICALS
f. o. b. shipping point

Alum (Papermakers)—	
Lump, cwt.	4.25-
Ground, cwt.	4.00-
Powdered, cwt.	4.40-
Blanc Fixe—	
Pulp, bulk, ton	40.00 to 46.00
Dry, barrels, pound	60.00 to -
Bleaching Powder—	
Drums, cwt.	2.25 to 2.10
Casein (Domestic Standard)—	
20-30 mesh (bags), lb.	20.00 to 21.00
80-100 mesh (bags), lb.	21.00 to 22.00
Argentine, lb.	19.50 to 20.50
China Clay—	
Domestic Filler Bulk (mine) ton	7.50 to 15.00
Domestic Coating Bulk (mine) ton	12.00 to 22.00
Imported (ship side) Bulk (lump) ton	15.00 to 26.00
Chlorine—	
Tank cars (wks) cwt.	2.00 to 2.25
Gelatine (silicin), lb.	.90 to .95
Glyc. (C.P.) drums, lb	18.25 to 18.75
Litharge, powd., bbl., lb.	.09 to -
Rosin (Gum)—	
New York, per 100 lbs.	
E	2.20-
F	2.25-
G	2.44-
WW	4.00-
Rosin (Wood), carlots	3.12-
Salt Cake—	
Dom. bulk (wks) ton	15.00 to 16.00
Imp. bulks on dock— (Atl. ports) ton (Nom.)	20.00 to
Soda Ash—	
Bulk (works), cwt.	.90 to .95
Paper Bags, cwt.	1.05 to 1.35
Barrels, cwt.	1.05 to 1.35
Soda (Caustic)—	
Solid, drums, cwt.	2.30 -
Ground and flake, drums, cwt.	2.70 -
Sodium Silicate—	
60 deg., 55 gal. drums, (works) cwt.	1.85 to 2.00
40 deg., 55 gal. drums, (works) cwt.	.90 to 1.45
Starch—	
Pearl, 140 lb. bags, cwt.	3.10-
Pearl, barrels, cwt.	3.20-
Paper (Sp.) bags, cwt.	3.20-
barrels, cwt.	3.30-
Sulphur (crude)—	
(mine) bulk, long ton	16.00 to 20.50
Talc—	
Dom. 100 lb. bags (mine) ton	18.00 to 20.00
Imp. bulk, ton (Nom.)	—
Titanium Dioxide—	
Barium Pig., bbls., lb.	.05¼ to .06
Calcium Pig., bbls., lb.	.05 to .05¼
Zinc Sulphide, bbls., lb.	06¼ to .06½

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OPA maximum prices applicable to wood pulp delivered to consumer mills located East of the Continental Divide exclusive of Denver, Colo.:

Bleached softwood sulphite	$76.00
Unbleached softwood sulphite	66.00
Bleached hardwood sulphite	75.50
Unbleached hardwood sulphite	63.50
Bleached Mitscherlich sulphite	81.00
Unbleached Mitscherlich sulphite	72.00
Northern bleached sulphate	86.00
Southern bleached sulphate	79.00
Northern semi-bleached sulphate	82.00
Southern semi-bleached sulphate	75.00
Standard news print siderunc	46.00
Northern unbleached sulphate	73.00
Southern unbleached sulphate	65.50
Bleached soda pulp	66.00
Unbleached soda pulp	62.00
Ground wood pulp	46.00
Sulphite screenings	38.50
Sulphate screenings	38.00
Ground wood screenings	30.00
Northern unbleached sulphate siderunc	73.00
Southern unbleached sulphate siderunc	63.50

PAPER
f. o. b. New York City

	per ton
Boards—	
Binders	84.00-
Chip	45.00-
Chip, sgl. mls. lined	60.00-
Coated, white patent .016	80.00-
.020 and heavier	75.00-
Kraft liner	60.00-
News	48.00-

	per cwt.
Book (uncut)	
No. 1 Coated	15.50-
No. 2 Coated	14.00-
No. 3 Coated	13.25-
No. 4 Coated	12.75-
No. 2 Offset	11.75-
A Grade Super	10.75-
B Grade Super	10.25-

	per cwt.
Bonds (Rag Content)—	
100% Rag Ext. No. 1	43.75 to 47.25
100% Rag	35.00 to 37.75
85% Rag	
75% Rag	30.90 to 29.00
65% Rag	
50% Rag	20.50 to 22.75
25% Rag	18.50 to 20.00
Regular Colors	1.00 cwt. extra

	per cwt.
Bonds (Sulphite)—	
No. 1	11.70-
No. 2	10.75-
No. 4	9.90-
Colors	1.00 cwt. extra
Glassine (f. o. b. mill)—	
Embossed (25 lb. up)	13.75 to 14.25
Bleached (25 lb. up)	12.75 to 13.25
Unbleach. (25 lb. up)	11.50 to 12.00
Greaseproof—	
Bleach. (25 lb. up)	11.00 to 11.50
Unbleach. (25 lb. up)	10.00 to 10.50

	per cwt.
Ledgers (Rag Content)—	
100% Rag Ext. No. 1	41 40 to 43.50
100% Rag	36 25 to 39.25
85% Rag	33.20 to 37.75
75% Rag	28.15 to 30.60
65% Rag	23.80 to 27.75
50% Rag	22.10 to 24.25
25% Rag	19.50 to 21.50
Regular Colors	1.00 cwt. extra
Ledgers (Sulphite)—	
No. 1	13.00-
No. 2	12.05-
No. 4	11.20-
News—	per ton
Rolls (Contract)	50.00-
Rolls (Spot)	(nominal)
Sheets	58.00 -
Tissues (Carlots)—	per ream
White, No. 1	1 12½
White, No. 2	1.00-
Bleached Anti-Tarnish	1.15-
Colored	—
Anti-Tarnish Kraft	.70-
Manila	.90 to .95
Napkins, semi-crepe (12¼ lb. to M shts.) per cs	.60 -
Napkins, full crepe and emb'sed (12¼ lb. to M shts.) per cs.	.60 -
Toilet, Bleached (M shts.) per cs.	5.65 -
Toilet, Unbleached (M shts.) per cs.	4.25 -
Towels—	per case
Bleached	3.20 to 3.75
Unbleached	2.60 to 3.05
Wrappings (Kraft)—	per cwt.
Extra Quality	6 00 to 7.00
Super-Standard	5.25 to 6.00
Northern Standard	4.75 to 5.00
Southern Standard	4.75 to -
Wrappings (Sulphite and Bleached Kraft)— (Rolls, f. o. b. mill)	
Bleached papers—	per cwt.
M.F.& M.G. Waxing, 30 lb. (Carlocds only)	7.25 to 7.50
(10,000 lbs.)	7.50 to 7.75
Drug wrapp. 35 lb.	7.00 to 7.25
Unbleached Papers—	
Com. Grd. Butch. 40 lb.	5.25 to 5.50
No. 1 Butchers	5.50 to 5.75
No. 1 Imit. Parch & Dry Fin.Groe.Sulphite 30 lb.	6.25 to 6.50
No. 2 Imit. Parch & Dry Fin.Groe.Sulphite 30 lb.	6.00 to 6.25
Steam Finish, 50 lb.	5.00 to 5.25
Water Finish, 40 lb.	5.25 to 5.50
Manilas—	
Envp. Mls., Sub. 16-40 (No. 1)	6.00 to 6.25
Envp. Mls., Sub. 16-32 (No. 2)	5.75 to 6.00
Envp. Mls. (Prices based on large sheets untrim'd rear-marked, in bdls.)	
Wrapp. Mls. 35 lb. up—	
No. 1	6.00 to 6.25
No. 2	5.75 to 6.00
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Grade B-30 lb.	7.25 to 7.50

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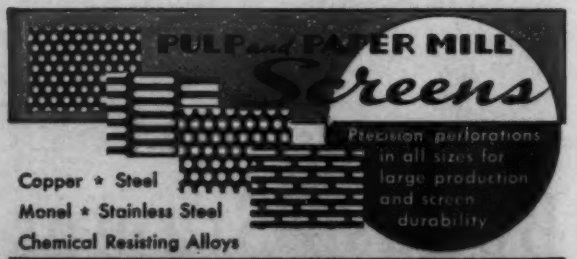
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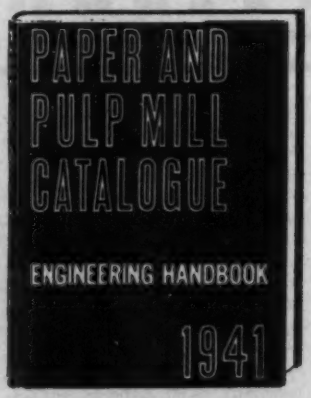

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DIGEST OF PRIORITIES

Affecting the Pulp and Paper Industry

Prepared by the American Paper and Pulp Association

The purpose of this compilation is to give management a ready reference on priorities, and to assist it in giving intelligent co-operation to the Pulp and Paper Branch of the War Production Board. This digest was released April 23, and it contains all rulings as of that date.

We have listed and briefly analyzed the various *P, M, L,* and *OPA* orders vitally affecting the pulp and paper industry. These are for ready reference only and before using the various orders and forms, you should read and study the complete order. Most of them have been sent out in A.P.P.A. bulletins beginning in May, 1941.

Priorities Regulation No. 1 (Parts 944.1 to 944.21)

This is the basic document which governs the operations of the priority system. This defines defense orders, makes acceptance of rated orders mandatory, specifies delivery dates must be part of orders, defines inventory restrictions, defines record keeping, and sets up penalties for violations of orders.

This was covered by our National Defense Letter No. 56 (December 29, 1941.)

Priorities Regulation No. 2

This regulation, issued September 9, 1941, simply made mandatory and legally enforceable *all* preference ratings heretofore or hereafter duly issued by the Director of Priorities.

Priorities Regulation No. 3

Provided for the revision of preference rating foms and established *PD-1*A and *PD-3*A. It provided for the extension of these ratings to suppliers and sub-suppliers and also set up restrictions for their use.

This was covered in our National Defense Letter No. 64 (January 20, 1942.)

Priorities Regulation No. 4

This order validated all orders signed by the Director of Priorities, Donald M. Nelson, and stated they would remain valid until cancelled, modified, changed or amended by the Director of Industry Operations.

Priorities Regulation No. 5

This regulation sets up rules regarding the reproduction of *PD* forms and *WPB* orders. Most forms may be reproduced (in the same size, form, etc.). Usually, it is indicated on a form if it cannot be reproduced.

Priorities Regulation No. 6

This regulation abolished the Army and Navy Critical List on February 11. However, it did not affect the Defense Housing Critical List. In effect, it allows the Army and Navy Munitions Board or the War Production Board to establish any material as critical.

Priorities Regulation No. 7

This regulation referred to the use of the facsimile signature in extending preference rating orders to suppliers and sub-suppliers. It allows for use of such signature providing the person whose name is used; gives written permission for each extension handled in this manner. It provided for the keeping of these records for two years. For most paper companies it is probably too cumbersome for efficient use.

Priorities Regulation No. 8

This regulation revoked the use of certain *PD* reporting forms, none of which directly affected the pulp and paper industry.

P Orders (Definition)

P orders are those orders granting, usually, a blanket priority rating to certain industries or parts of certain industries to aid them in acquiring needed supplies. A few of them affect the paper industry either directly or indirectly. Only one—*P-100*—is vitally important to the industry. It is expected that this form of order (P series) will be largely replaced by *PD-25A* (See P-90) within the next few months, but will have little effect on the paper industry.

M Orders (Definition)

M orders assume control over materials (mostly raw) and usually provide that they shall not be delivered or accepted except in accordance with rules prescribed in the order. Thus, pulp is controlled by *M-93*. The basic principle of *M* orders is that war needs must come first and the balance distributed in accordance with the essentiality of the end use of the products. Usually they provide a pool to be set up for emergency use, and this pool is subject to allocation by the War Production Board.

L Orders (Definition)

L or Limitation orders are usually negative allocations. For example, they limit the amount of chlorine or power that can be used, or limit the amount of certain products, such as machinery and equipment, that can be manufactured. Automobile, truck and refrigerator production are among those items that have been limited by *L* orders. Those *L* orders relating to the pulp and paper industry are reviewed hereafter.

NOTE: In all cases where application for relief is made to a section other than the Pulp and Paper Branch, it is suggested that a carbon copy of the letter be sent to the Priorities Section, Pulp and Paper Branch, WPB.

P ORDERS (For Supplies)

(P-40) Lift Trucks

A rating of A-1-J is required and unless a manufacturer has direct war contracts probably none will be available.

(P-43) Research Laboratory Supplies

This order only slightly affects the pulp and paper industry. Those few plants that operate a bona fide "research" laboratory can get a rating of A-2 to apply on supplies needed. Use *PD-88* to apply for a rating. *PD-93* is used to report orders to which rating is assigned and *PD-107* is a questionnaire for applicants. See our National Defense Letter No. 23 (September 16, 1941).

(P-79) Non-Metal Containers

This order assigns an A-7 rating to uses of steel wire and an A-5 on other ferrous materials used in making wooden and paperboard containers. Use application *PD-82* if the

A-10 under *P-100* is not high enough to get the same materials.

(P-90) Production Requirements Plan

This was issued December 3, 1941, and it replaced the Defense Supplies Rating Plan (*P-6*) and is designed primarily to aid those plants producing war products. It does not apply particularly to the pulp and paper industry. Pulp and paper manufacturers might well review form *PD-25A* with the thought in mind that it or something similar may be required but we do not advise filing it with the War Production Board at this time. See our National Defense Letter No. 44 (December 8, 1941).

(P-100) Maintenance, Repairs and Operating Supplies

Maintenance, Repairs and Operating Supplies Order *P-100* replaced *P-22*, December 18, 1941, and assigns to various industries including the paper and pulp manufacturers an A-10 rating on Maintenance, Repair and Operating Supplies. It limits inventories and withdrawals of such items to 110 per cent of the corresponding quarter of 1940. A company can apply an A-10 rating without application to the War Production Board. It cannot be used for plant expansion or improvements. Toilet tissue, towels, writing paper, office machines, etc., are not operating supplies within the meaning of this order. Likewise, it does not apply to any supplies physically incorporated in manufactured products.

See complete copy with our National Defense Letter No. 53 (December 23, 1941) and Letter No. 94 (March 25, 1942).

M ORDERS (Raw Materials)

(M-1-g) Aluminum Pigment

This order regulates the supply and use of aluminum pigments by eliminating its use except as the Director of Industry Operations may direct. Application for its use is made on *PD-312* to the WPB, attention, *M-1-g*.

(M-6-b) Nickel

This order, effective January 20, 1942, practically eliminates the use of nickel in the paper industry. In case it is felt there is no substitute, one may appeal to the Nickel Branch of the War Production Board setting forth the pertinent facts of the case and the Director will take such action that he deems appropriate. Apply to the War Production Board, attention, *M-6-b*.

(M-9-a, b, c) Copper

Priorities orders *M-9-a*, *M-9-b*, and *M-9-c* apply to copper. The copper situation is becoming more and more desperate because direct demands for war purposes exceed the supply and it appears the situation will continue for the duration.

Fourdrinier wire and other paper mill cloth: While this is being written, an A-10 under *P-100* will obtain deliveries of this material but it is important that inventories be kept at a minimum. Unless there is prompt and voluntary cooperation with the WPB on this item, it is likely that stricter measures will be taken. We can look forward to inspections of inventories in the near future.

(M-15) Rubber

This order relates especially to manufacturers of rubber products and is significant to the paper industry because it drastically restricts the use of rubber in almost all commodities except those having a bearing on direct war effort.

(M-15-c) Tires, Rubber

The rationing of tires is accomplished through local boards set up in the various counties of the United States and controlled by a State Rationing Board. Tires are rationed on showing of needs with war industries coming first, high civilian use second, etc. There is small possibility of purely civilian users getting any allotment.

(M-17) Pig Iron

Under this order, customers must submit their monthly requirements with producers on form *PD-69* by the 5th of each month; and by the 12th of each month a report to WPB on form *PD-70* showing stocks, consumption and requirements for the following month. *PD-71* submitted at the same time to WPB shows proposed shipments for the following month. No shipments can be made without WPB approval.

(M-19) Chlorine

As amended December 20, 1941, this order provides for direct allocation after February 1, 1942. Use *PD-190* with all orders on producer. The producer files *PD-191A* and duplicate copies of *PD-190* with WPB by the 15th of each month. The order curtails the use of chlorine and also prohibits its use for certain things. *PD-277* must accompany orders for products containing available chlorine. See our National Defense Letter No. 85 (March 4, 1942).

(M-21) Steel

(Steel Castings, Steel Forgings, Drop Forgings, Steel Reinforcing Rods, Seamless Tubing, Steel Roller Bearings and Ball Bearings, Steel Structural Shapes and Angles.)

1) *Steel Castings*—An A-10 rating will get small quantities in about six months. Look for new *L* order on this class of steel.
2) *Steel Forgings*—Upset forgings may be obtained in nominal quantities in 30-60 days under an A-10 rating.
3) *Drop Forgings* of medium size may be obtained within 60-90 days on an A-5 rating for nominal quantities. Heavy forgings of open frame type require an A-1-J rating to obtain delivery of nominal quantities within 90 days.
4) *Steel Reinforcing Rods*—A-1 ratings required which may produce deliveries in some parts of country in four to eight weeks. Extremely tight situation due to its use for war needs.
5) *Steel Seamless Tubing*—At least an A-1-J rating required for six to seven months delivery. Should substitute welded tubing whenever possible. Material extremely critical and each application must be decided on its own merits.
6) *Steel Roller Bearings and Ball Bearings*—A rating of A-3 or better required to obtain delivery within six months. Situation likely to become worse due to war demands.
7) *Steel Structural Shapes and Angles*—Delivery under A-1-J indefinite. An A-1-C is needed to get delivery in six to eight weeks. This situation is getting tighter every day.

(M-21-c) Steel Plate

Ratings of A-1-B or higher are required for deliveries of sheared plates whereas A-1-J or higher are required for strip mill or universal mill plates. *PD-298* form is used for priorities application. Deliveries require eight to ten weeks.

(M-21-d) Chromium or Stainless Steel

This order freezes chromium or stainless steel and it is almost impossible to obtain same. It also prohibits use, fabrication or processing of that already owned without an A-1-K rating, but does not apply to already fabricated material.

(M-25) Formaldehyde and Synthetic Resins

This order covers formaldehyde and synthetic resins. Manufacturers having defense orders can extend the rating to obtain formaldehyde. If he has a defense order without a rating he can apply A-10. For use in paper manufacture other than defense he is granted a B-8 rating.

(M-29-b) Tungsten

Prohibits use of tungsten in paper manufacture after May 1, 1942. Between February 1 and April 30 the order limits use to 17.5 per cent of amount used in that item in the year which ended June 30, 1941. Exceptions for paper use are for Government or Lend-Lease orders if its uses are specified in the contracts. Otherwise only an A-1-J rating will get you tungsten.

(M-30 and M-31) Ethyl and Methyl Alcohol

The orders M-30 and M-31 relating to ethyl and methyl alcohol and related compounds restrict their use in certain commodities but have not as yet had any effect on the pulp and paper industry. These orders are significant only that they indicate a trend toward further restrictive orders that may affect that industry to some considerable extent.

(M-43-a) Tin

This order prohibits the use of tin in the manufacture of oil (except for condensers, electrotyping and moulding lead in printing trade X-ray supplies and dental use) and in the manufacture of coated paper except for use of defense agencies and lend-lease orders where the contract specifies it shall be used. It also prohibits its use in many other ways that do not affect the pulp and paper industry. While tin is contained in fourdrinier wires, wire manufacturers now obtain sufficient supplies. It is possible, however, that tin allocated for this purpose might be reduced or eliminated.

Any manufacturer may appeal to the War Production Board on form *PD-229*—Reference *M-43-a*, if he feels he has a legitimate case.

The tin situation is generally tight with inevitable prospect of its becoming tighter.

(M-44) Titanium Pigments

This order sets up a defense pool of 25 per cent production to fill mandatory orders. The remainder is prorated on an equitable basis to all customers. Use forms *PD145* and *146*. See our National Defense Letter No. 61 (January 14, 1942).

(M-51) Pigs' and Hogs' Bristles

This order requires manufacturers of articles containing pigs' and hogs' bristles to use only 55 per cent of bristles in such products and 45 per cent of substitutes. Coated paper manufacturers will do well to study other methods of coating paper since practically all bristles are imported from China. See our National Defense Letter No. 51 (December 22, 1941).

(M-55-f) Invert Sugar

This order limits consumption of sugar to 70 per cent of 1941 use in 1942 and a manufacturer using invert sugar may accept his 1942 quota at any time providing he does not take more than 10,000 pounds in any one month. Manufacturers using any considerable quantity of this product should study the order (*M-55-f*) and take the matter up with WPB at an early date.

(M-58) Glycerine

Under this order, all glycerine in excess of fifty pounds per month is placed under direct allocation. Starting May 1, 1942, users are generally limited to 70 per cent of their 1940 consumption except for war orders and health supplies. Its use in antifreeze is prohibited.

Consumers file form *PD-362* with the suppliers and the WPB monthly. The producers use form *PD-363*. Any consumer who used more than fifty pounds in any one month for the six months prior to March 31, 1942, must report to WPB on form *PD-361* by May 1, 1942.

(M-73) Wool

This order restricts manufacturers of woolen products to 80 per cent of basic quarterly poundage. While it is possible now for paper manufacturers to fill their needs with an A-10 or higher, it is not expected that the situation will get any easier for some time.

(M-91) Cotton Duck

A rating of better than A-2 is required to get delivery on sizes specified in the order. The situation is tight. Paper mill dryer felts are not considered "duck" within the meaning of this order.

(M-93) Wood Pulp

This order provides for complete allocation of all wood pulp starting May 1st. Consumers use forms *PD-290* and *291*. Producers use form *PD-292*. Form *PD-290* is sent in triplicate to the supplier by the 5th of each month starting with April. One copy of form *PD-291* is sent to WPB by the 15th of each month; and form *PD-292* is sent by the producer to WPB by the 15th of each month. On the 20th of each month the Pulp Allocation Board, which is made up of 13 representatives of the industry, meet to advise with the Pulp and Paper Branch relative to allocations. The allocations are prepared by the Pulp and Paper Branch of the WPB. See our National Defense Letter No. 95 (March 25, 1942).

(M-97) Coal and Coke Inventories

This order removes from restriction inventories of coal and coke. It encourages users to stock up on coal, in order to relieve expected coal car shortages later on in the year, even though it increases their inventory beyond a practical working minimum. Manufacturers are urged to stock up on coal and coke now. See our National Defense Letter No. 80 (February 26, 1942).

(M-100) Trucks

This order became effective March 9, 1942. In order to buy new trucks, get forms and instructions from dealers selling the make you wish to buy. Preference is, of course, given defense industries, military forces, police, public health and sanitation services. The paper industry has some chance if the supply holds for any time, and an applicant can show war production or high civilian use. See our National Defense Letter No. 89 (March 13, 1942).

(M-129) Waste Paper Inventories

This order removes the restriction on waste paper inventories of consumers. Under this order a user of waste paper may accumulate waste paper without limitation or regard to Priorities Regulation No. 1. See our National Defense letter No. 101 (April 8, 1942).

L ORDERS (Restriction or Abolishment)

(L-11) Chlorine

Restricts use of chlorine in various grades of pulp to about 70 per cent of normal needs. It also restricts use of chlorine in other ways for other industries (*See M-19*).

(L-20) Cellophane

Order L-20 with reference to cellophane and similar transparent materials derived from cellulose became effective November 8, 1941, amended January 10, 1942 and March 17, 1942. The order lists a large number of items that may not be wrapped in cellophane and users or manufacturers are urged to obtain a copy of the order before using or manufacturing cellophane.

(L-41) Building Construction

L-41 prohibits starting new building construction after April 9, 1942, but allows completion of projects already started. In order to start new construction it is necessary to apply on form *PD-200* and *200A* and file it, not with the War Production Board, but with the local field office of F. H. A. There are a few exceptions to this order but they do not directly apply to the paper and pulp industry.

(L-46) Electric Power (Niagara Falls Area)

This order provides for integration of generating systems by utilities and industries and curtailment of consumption in the Niagara frontier area in event of power shortage.

(L-83) Heavy Industrial Machinery

Effective April 9, 1942, it prohibits the use of A-10 on repairs and maintenance items for the pulp and paper industry valued at over $1,000, unless an actual breakdown occurs or suspension of operations because of wear and tear, etc. A manufacturer will use a *PD-1A* application in acquiring repair parts over $1,000 or in acquiring new critical industrial machinery.

PD-3-A Certificate can only be used in connection with this order to assign preference ratings to approved orders to be delivered to, or to the account of the agencies listed in the order (Government and Lend-Lease). *PD-3* and *PD-3A* certificates countersigned prior to the effective date of *L-83* are also valid.

This order has the effect of tightening up on critical materials going into machinery and limiting the expansion of non-essential industries. See our National Defense Letter No. 102 (April 13, 1942).

(L-95) Cotton Gauze

This order reduces the amount of cotton gauze in sanitary napkins by standardization of sizes. It also limits inventories from becoming excessive and makes it mandatory for manufacturers to report by letter to the War Production Board their 1940 production on or before May 9, 1942.

CASEIN

No orders are in force respecting casein and none are expected. No rating is needed to obtain normal delivery.

DYES

(Acid, Basic and Direct)

While no priority orders have been issued to date relative to these dyes, the Dye Unit of the WPB has asked for a 50 per cent cut by all users based on 1941 consumption. As far as the paper industry is concerned, this cut may be uniform or average of all. Some dyes, such as those made from diphenylamine, may be unobtainable shortly. For example, metanil yellow.

Organic Pigment and Chrome Pigment

The supply of organic pigment dyes and chrome pigment dyes is critical and users are asked to cut their use by 50 per cent of 1941 usage. No order is out on these yet.

Cadmium Base Dyes

Cadmium base pigment dyes are in a critical condition and the industry is asked to curtail their consumption.

Inorganic Pigments

Inorganic pigments generally are under no particular restrictions at this time with the exception of Cadmium base and Chrome pigments.

The Pulp and Paper Branch of WPB is asking that paper manufacturers write to them with comments on paper grades or particular papers which cannot be made without impairing their utility under conditions outlined above.

Since failure to comment will be interpreted as approval, it is urged that users of these dyes comply with this request and discuss the situation frankly and fully.

FORM PD-1A AND FORM PD-3A

Since the pulp and paper industry neither enjoys the benefits of a blanket rating preference order nor is it under a Production Requirements Plan, most of its supplies that require a preference rating are obtained through the use of form PD-1A. This is used at times for maintenance and repair items where the A-10 *(P-100)* is not high enough for the suppliers to fill their orders.

This form replaced the old *PD-1* form and has an advantage over *PD-1* since ratings received on it can be extended to the suppliers and sub-suppliers. It is also simple to fill out and is easily acted upon by the WPB and little time is lost in getting a rating where a rating is justified.

PD-1A is used to get a preference rating on supplies, equipment, and in some cases repairs. It is not to be used to get a rating on the building of new plants or the expansion of old ones. (Form *PD-200* is used for this.) *PD-1-A* is not used to get deliveries under purchase contracts of the Army, Navy and certain other Government agencies. For these the Contracting Agent of the Army or Navy will assign ratings on form *PD-3A*. *PD-1A* cannot be used to get materials that are incorporated in the manufactured product in quantities greater than a one month's supply.

PD-1A may be reproduced in blank by or for the user. Form *PD-3A* may not be reproduced and may be procured only from duly authorized inspecting, contracting and procurement officers of the Army and Navy. See our National Defense Letter No. 73 (February 5, 1942) in connection with Priorities Regulation No. 3.

GLUE

No orders are in force respecting glue distribution and none are expected. No rating is needed to obtain normal delivery. (See Price Schedules.)

SODIUM CARBONATE, SODIUM HYDROXIDE, SODIUM SILICATE, AND SODIUM SULPHATE

No orders are in force and none are expected. No rating is needed to obtain normal delivery.

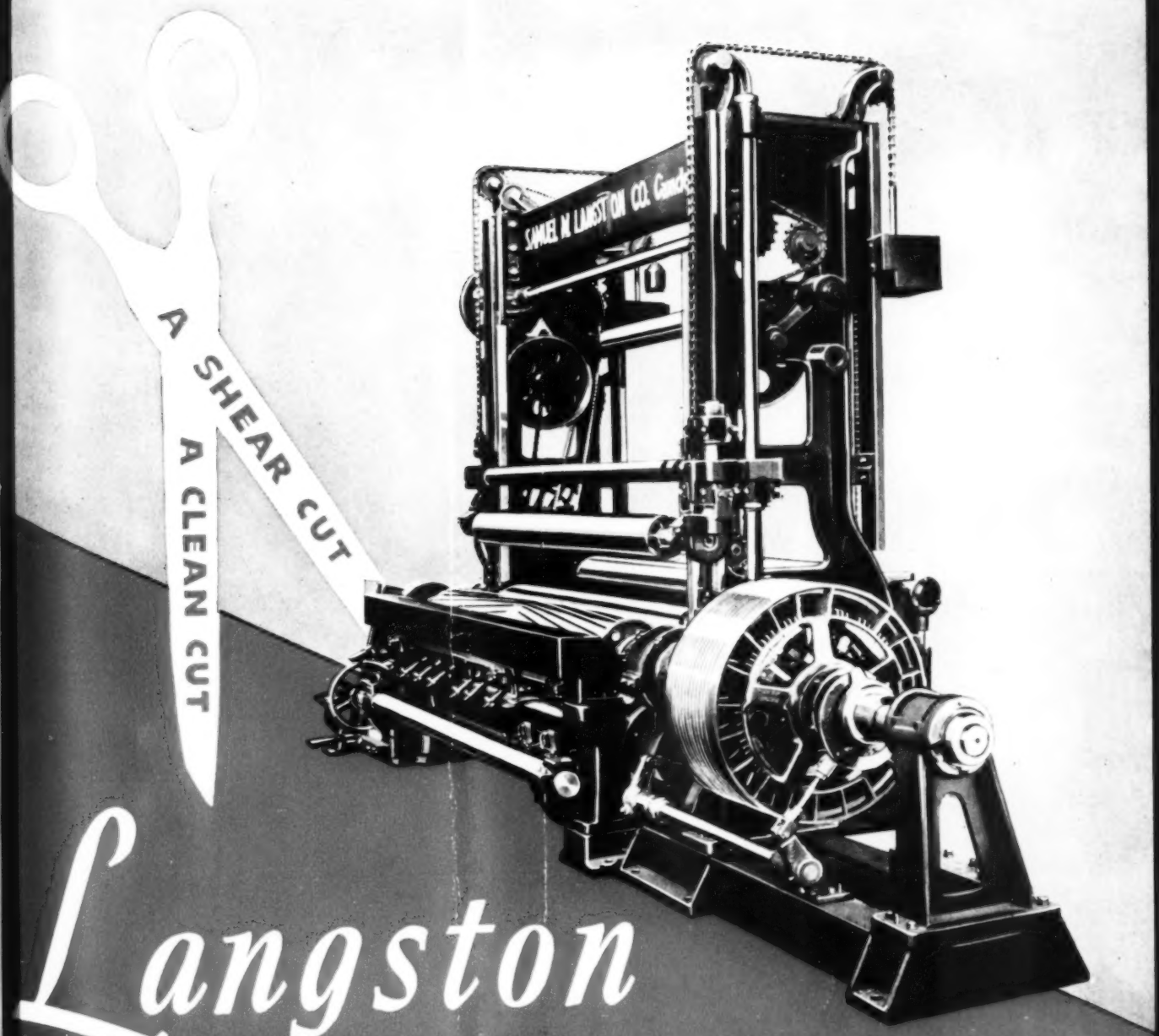
TAPIOCA

No orders are in force as yet but an order is expected. This probably will prohibit its use in the manufacture of paper, but may provide for the needs of the envelope manufacturers.

OPA—PRICE SCHEDULES

Since these prices as set by OPA are subject to current changes, we are not quoting them here. In case you are buying considerable quantities, we advise you check with OPA or this office for the last price schedule issued.

No. 2	Aluminum—Scrap
No. 3	Zinc—Scrap
No. 4	Iron and Steel—Scrap
No. 5	Coal—Bituminous
No. 6	Iron and Steel Products
No. 10	Pig Iron
No. 12	Brass Mill Scrap
No. 18	Burlap
No. 20	Copper—Scrap
No. 21	Formaldehyde
No. 27	Coal—Anthracite
No. 28	Alcohol—Ethyl
No. 30	Paper Waste
No. 31	Acetic Acid
No. 32	Paper Board
No. 34	Alcohol—Wood
No. 36	Acetone
No. 37	Alcohol—Butyl
No. 38	Glycerine
No. 42	Wax Paraffine
No. 47	Rags
No. 55	Bags—Second Hand
No. 66	Tires—Retreads
No. 68	Glue Stock
No. 76	High Glue
No. 79	Carbon Tetrachloride
No. 98	Titanium Pigments
No. 114	Wood Pulp



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As a matter of fact, an AEROSOL Wetting Agent molecule resembles a paper machine in that it has a "wet end" and a "dry end." The wet end is compatible with water and the dry end is attracted by substances that are repelled by water. Keeping this fact in mind helps to picture the action of AEROSOL Wetting Agents, and to understand why they affect only the *surface* of an ordinarily water repellent body without necessarily influencing the mass of the body below the surface. Because of these properties, AEROSOL Wetting Agents have a great variety of uses, some of them quite surprising, and new applications are constantly being discovered.

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2. Conditioning new felts.
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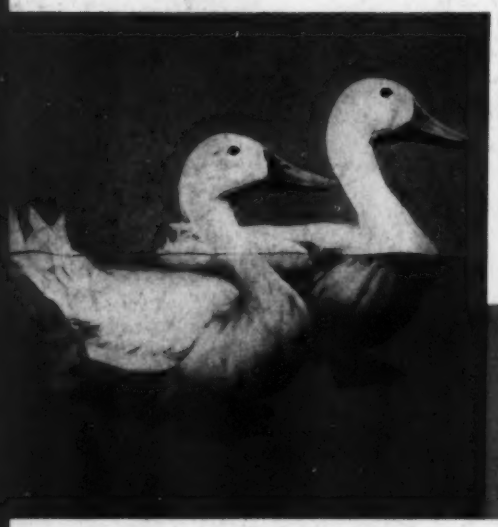
5. Preserving absorbency of towel stock.
6. Surface dyeing of paper.
7. Impregnation of paper with inorganic salts.
8. Increasing absorbency of certain types of papers.

In order to secure best possible results under the great diversity of conditions that wetting agents encounter, a number of different types have been developed. The presence of other chemicals may prohibit the use of one or another of these products and, therefore, the choice of type is important.

FULL INFORMATION IS AVAILABLE. An interesting booklet has been prepared describing the various types of AEROSOL Wetting Agents, their properties and applications. This is available to anyone interested, for the asking. It may be, however, that you have a problem which, while falling in this general field, is not covered by the booklet. If so, talk it over with your Cyanamid representative, or write to your Cyanamid District Office. There is no obligation.



(*Left*) AEROSOL makes water wetter by reducing surface tension. Here is a graphic illustration of this effect of AEROSOL. Eliminate by the action of AEROSOL the film with which a duck's feathers are coated, and the water will penetrate and literally waterlog the duck so that it will sink. The duck at the left above has been so treated with AEROSOL, while the duck at right above is untreated. This is an actual photograph.

(*Above*) Paper products treated with AEROSOL Wetting Agents are capable of absorbing water more rapidly. This is particularly advantageous when applied to the manufacture of the types of products shown here. Beer mats and paper towels have increased utility value and efficiency, a characteristic essential to their maximum serviceability.

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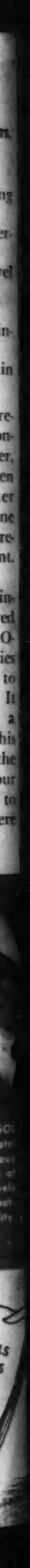
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